
# AN ANALYSIS OF MUNITIONS SUPPORT TO THE US AIR FORCES DURING THE VIETNAM WAR

THESIS

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AFIT/GLM/LS/88S-28



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2

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THESIS

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of the Air Force Institute of Technology

Air University

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## Table of Contents

## List of Figures

## Abstract

This analysis examined Air Force munitions logistics support in the Vietnam War. It's objective was to foster an understanding of the munitions logistics system, the level of preparedness before the war started, the problems encountered, and the solutions to those problems. The author hoped to highlight those problems which impacted upon Air Force operations and focus the attention of logisticians toward viewing future munitions support as an indispensible part of the nation's preparation for war.

Chapter Two presents a short history of the munitions industrial base from World War I up to the beginning Vietnam War. It looks at the level of preparedness of the munitions industrial base prior to each war and the problems encountered in trying to maintain industrial readiness in the periods of peace between the wars.

Chapter Three lists the military and civilian organizations which supported Air Force munitions operations during the war. It starts with the evolution of the Department of Defense, goes through the Joint Chiefs of Staff, and then to the military organizations which made up the chain-of-command. The purpose is to help the reader establish an understanding of the organizations which later

influenced operations when munitions shortages became a problem.

Chapter Four is a chronology of munitions shortfalls. It discusses the condition of the munitions stockpile at the start of operations in 1965. Next, it looks at the impact of munitions shortages and the centralization of management authority and responsibility to higher levels of command up through the Department of Defense. It looks at other problems and solutions which were created as a result of munitions shortages, such as reporting procedures and transportation initiatives.

Chapter Five is the conclusions, recommendations, and actions taken since the war's end. It also lists several topic areas for future study.

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## I. Introduction

### Overview and Justification

"The art of war teaches us to rely not on the likelihood of the enemy not coming, but on our own readiness to receive him" (34:30). These were the words of the Chinese philospher and general, Sun Tsu, who, 2500 years ago, emphasized not only the inevitability of war, but the importance of being prepared to meet the enemy at all times. Another prominent military figure, General Douglas MacArthur, had this to say about the importance of history to the military leader:

> More than most professions, the military is forced to depend on intelligent interpretation of the past for signposts charting the future. Devoid of opportunity, in peace, for self-instruction through actual practice in his profession, the soldier makes maximum use of historical record in assuring the readiness of himself and his command to function efficiently in emergency. The facts derived from historical analysis, he applies to conditions of the present and the proximate future, thus developing synthesis of appropriate method, organization, and doctrine [34:1].

The ideas of these two leaders, separated by 2500 years, developed the concept of readiness and insist the study of military history is essential to the military professional. The ideas are as important today as when they were written. Today, during peacetime, the United States Air Force (USAF) relies on operational readiness inspections and

combat exercises to assess and improve combat capability. Unfortunately, complete readiness is difficult to achieve without knowing the environment of the battlefield or the variables which will affect the course of events. Many of the realities of actual war cannot be duplicated in exercises or simulations. Consequently, most military leaders will face elements of uncertainty once the real battle starts. One way to reduce the uncertainties is to study past wars or combat operations with the intent of rediscovering those ideas and activities which proved successful in the past, and to help today's warriors prevent making the same mistakes again in a modern conflict.

## Specific Research Problem

Since the end of the Vietnam conflict the Air Force has lost many of its experienced munitions support personnel through retirement or separation. These professionals took with them the valuable lessons they learned supporting combat flying operations in Southeast Asia. At the time of this writing, of the 931 munitions officers on active duty, only 222 have combat experience in Southeast Asia. And of the 26,654 enlisted munitions technicians, only 156 of them have combat experience (6). These numbers will continue to decrease as time goes on. Consequently, in the future we will take into combat a new generation of munitions personnel who have no combat experience. The USAF can do very little to stop this evolution of personnel. It will

continue to be a function of the amount of time between wars. But neither can we stand by and let the lessons of the past be forgotten. Promoting the study of military history is an effective way to keep alive the valuable lessons learned by those munitions professionals who have served in the past.

This research was directed at helping the USAF promote improved combat munitions support through the study of munitions operations during the Vietnam War. By studying USAF munitions operations during this period, the author hopes to improve the combat performance potential of munitions technicians and to reenforce the importance of munitions support to the Air Force mission. If this is accomplished, the Air Force can achieve the synthesis of appropriate method, organization, and doctrine General MacArthur said was available in the study of military history.

Scope and Limitations

This paper will discuss munitions support to USAF combat forces in Southeast Asia. In particular, it focuses on the shortfalls which affected combat operations and how they were corrected. The analysis is limited to the USAF combat operations except where other military services or elements of the government and civilian sector directly supported Air Force munitions operations. Also, it is limited to discussing air munitions, or those types of weapons and

explosives which were carried on aircraft and either dropped or launched from aircraft. For the purposes of this paper the terms munitions and air munitions are synonymous.

Chapter Two is an analysis of the nation's munitions industrial base during the period from World War I to the start of the Vietnam War. This historical background of munitions production will give the reader an appreciation of the difficulty military leaders had in the past in building and maintaining a munitions production base. It will show how the industrial base transitioned between war and peace and back to war, and the impact on military capability when production was not maintained, as was the case in the Vietnam War.

Following the discussion of the industrial base, Chapter Three will analyze the various organizations which supported, or otherwise impacted upon, USAF munitions operations. It starts with the Air Force Systems Command (AFSC), highlighting five organizations within the AFSC which influenced munitions operations and the problems encountered in munitions development for the war effort. A discussion of the Air Force Logistics Command (AFLC) follows. Several important organizations within the AFLC are discussed such as the Ogden and Warner-Robins Air Material Areas (AMA), and the 2705th Air Munitions Wing, a unit assigned to the Ogden AMA. Following the discussion of USAF organizations, the report proceeds to analyze munitions support provided by the Army and Navy. Within the Army, the

paper follows the functional organization of the US Army Munitions Command including the US Army Ammunition Procurement and Supply Agency (APSA), and the National Inventory Control Point (NICP). The next agency discussed is the US Navy and their impact upon munitions transportation. The last agency discussed is the Military Sea Transportation Service (MSTS). As the major source of munitions movements to Southeast Asia, the MSTS strongly influenced the Air Force's ability to support combat operations.

Chapter Four is entitled Munitions Logistics Chronology. It's purpose is to present a chronological analysis of the events and agencies which affected USAF munitions. The report presents the problems, and their solutions, in the order in which they occurred during the war. It begins by discussing the events leading the US directly into combat in 1964 with the actions of the US Navy in the Gulf of Tonkin and proceeds into the initial deployment of USAF forces to both South Vietnam and Thailand. A discussion of munitions stockpiles and shortages follow the section on deployment. And following that are the changes in munitions management controls and reporting procedures which resulted from the shortages. One of the most significant actions to correct munitions shortfalls was the development of the sealift munitions transportation system. Three shipping programs: Projects Special Express, Special Vessels, and SunBath are discussed, along with the program to airlift certain munitions to the war.

Chapter Five ends the report with conclusions and recommendations. It shows how the report answered the investigative questions and looks at what has been done in munitions logistics since the end of the war. It also proposes several topics for future study.

## Investigative Questions

The following questions will be used to solve the specific research problem:

1. With reference to procurement, the industrial base, and prepositioning of assets at strategic locations, what was the condition of the air munitions stockpile prior to start of USAF combat operations in 1965?
2. What civilian and military organizations were involved in supporting USAF munitions logistics operations in the Vietnam War and how effective were they?
3. How was the munitions reporting system organized and how effective was it?
4. How were the continental US and the intra-theater munitions transportation systems organized and how effective were they?

## Methodology

As an historical analysis, this report relied mainly upon secondary information gathered from numerous sources. Several libraries were searched for information on the topic. They included the Air Force Institute of Technology, School of Systems and Logistics Library at Wright-Patterson

Air Force Base OH; the Air Force Logistics Command Historical Library at Wright-Patterson Air Force Base, the Simpson Historical Research Center at Maxwell Air Force Base AL; and the historical library at Headquarters, Pacific Air Force Command, Hickam Air Force Base HA.

A list of descriptors was submitted to the Defense Technical Information Center (DTIC) and Defense Logistics Studies Information Exchange (DLSIE) services. DTIC searches proved to be valuable for munitions topics whereas the DLSIE searches provided little munitions information.

Rand Corporation studies and periodicals from 1965 through 1987 were reviewed. Although the Simpson Historical Research Center contains a great amount of information on munitions operations in Vietnam, all sources which this author found were classified either confidential or secret until 1991, and thus could not be used in this unclassified report. The AFLC Historical Library provided several unclassified executive summaries, historical studies, and end of tour reports detailing AFLC support to the war.

A primary source of information was an interview, conducted at Wright-Patterson Air Force Base OH, with Col J.B. "Butch" McGehee, a key munitions leader involved in many innovative projects throughout the time period this report covers.

Definitions

The following list of definitions and terms are used in the report and are explained below to help the reader who may be unfamiliar with munitions operations.

**ACP:** Ammunition Control Point, a single point of control and management for munitions in a specific theater of operation; usually an organization in a position of authority over many subordinate units.

**AFLC:** Air Force Logistics Command

**AFSC:** Air Force Systems Command

**Air Munitions:** a variety of explosive devices which can be attached to an aircraft for aerial delivery and firing or dropping on ground targets.

**Ammunition:** the term which encompasses the various types of explosives used by all military services, such as Army howitzer and mortar shells, Navy bombs and ship gun ammunition, and the range of Air Force munitions.

**Bombs:** a type of air delivered explosive device which contains high explosive and is designed to be used against hard targets. It produces destruction through fragmentation and/or blast.

**CBU:** Cluster Bomb Units, a type of air delivered bomb which contains many sub-munitions, or bomblets. The unit is

designed to be delivered over the target where it opens to release the sub-munitions across a wide area. Usually used for area denial or against a concentration of troops.

**Competitive Bid Contract:** a method of acquiring materials and services from the civilian sector for government use. The key element to this type of contracting is that the government advertises to bring into the contracting process as many potential contractors as possible. The purpose is to have each contractor propose a cost for the services to be rendered. The government chooses the contractor according to the lowest bid.

**FOB:** Forward Operating Base, a location from which combat operations are conducted but on which complete support facilities are not available.

**FYDP:** Five Year Defense Plan. The official document which summarizes the SECDEF approved programs for the DOD. A detailed compilation of the total resources programmed for the DOD. It projects five years into the future for all DOD program requirements (8:5).

**GOCO:** Government Owned/Contractor Operated, an agreement between the government and the civilian sector with respect to munitions production facilities. The government retains ownership and responsibility for the facilities. However, day-to-day management of production is accomplished by a civilian workforce.

**Industrial Base:** a combination of civilian and government owned industrial facilities which are capable of producing war materials such as steel, petroleum, ammunition, and rubber.

**Industrial Mobilization:** the process of preparing and controlling industry to meet the unprecedented demands of modern war for munitions and military supplies of all kinds (16:6).

**MAP:** Military Assistance Program, a program created in 1947 as a result of the Truman Doctrine to provide grant military aid to nations which supported US foreign policy objectives. Its intent was to give military capability to US spheres of influence where it was lacking (15:6-7).

**MOB:** Main Operating Base, a location from which deployed combat units can obtain complete support.

**Mobilization:** the term used to refer to the rapid expansion of military production to meet materiel demands in a war fighting situation. It involves the declaration of a national emergency by the President (35:3).

**MSA:** Munitions Storage Area, the area of the base where munitions are stored and assembled.

**Munitions Control:** the single point of control and coordination within the Munitions Storage Area for munitions assembly, storage, and transportation operations.

**Pull Supply System:** a method of supply support used in cases where a logistics infrastructure is established upon arrival of combat forces. Requisition actions are initiated by the using unit (33:31).

**Push Supply System:** a method of supply support used in cases where a logistics infrastructure is not established prior to deployment of combat forces. The deployed unit does not order supplies. Requirements are determined by higher headquarters and automatically shipped to the unit (33:31).

**Research and Development:** one of the earliest phases of weapons systems development which usually includes the analysis and testing of new technology for inclusion into new or modified munitions.

**SEA:** Southeast Asia. For purposes of this study, it refers to the countries of North and South Vietnam, Thailand, Cambodia, and Laos.

**SECDEF:** Secretary of Defense.

**Sole Source Contract:** a method of acquiring materials and services for the government through civilian suppliers, but in which competition between multiple suppliers is not required due to lack of contractors, or because time does not permit the use of competitive procedures.

**Sortie:** the time between take off and landing for one aircraft flying one mission.

**Surge:** the expansion of military production in a peacetime mode without the declaration of a national emergency (35:3).

**Total Mobilization:** describes expansion beyond existing force structure after the first day of declared war (35:3).

Wartime Guidance: a war planning document designed to provide a single source of current policies, doctrines, and guidance concerning the conduct and support of all levels of conflict. It translates Joint Chiefs of Staff general guidance into basic guidance for the Air Staff, Major Commands and other subordinate organizations (30:II-2-110)

Wartime Requirements: an annex to the Wartime Guidance document. It translates strategic concepts and policy guidance of the Wartime Guidance into material requirements factors for a five year period (30:II-2-111).

WCDO: Wartime Consumables Distribution Objective, a war planning document prepared by Air Force Logistics Command which shows quantitative war reserve material objectives for war consumable material for all bases worldwide. It is the basis for prepositioning war reserve material (30:II-2-111).

**WRM:** War Reserve Material, a combination of expendable and non-expendable material which is prepositioned in theaters of operation before combat operations begin.

**WRSK:** War Readiness Spares Kit, a predetermined quantity of equipment and spare parts assembled, maintained, and mobilized with units as they deploy for combat.

## II. Industrial Base History

The Air Force entered the Vietnam War unprepared to provide sustained munitions combat support operations. This was caused by the nation's failure after World War II and the Korean War to maintain an adequate industrial base capable of producing combat quantities of munitions with minimum lead times. This problem could have been avoided. In fact, critics of the three wars prior to Vietnam not only identified the shortfalls, they also developed ways to prevent them from recurring. Unfortunately, funding of the munitions production base was not maintained at the required level of readiness, nor had the required level of readiness ever been established. An analysis of the nation's industrial preparedness from World War I up to the start of the Vietnam War showed that the United States could have entered the war better prepared to meet munitions needs.

### World War I

World War I was classified as the world's first total war where sophisticated weapons and machines were used on a large scale requiring extensive industrial production support. Prior to this war, the nation's military might depended mostly upon men, horses, rifles with small arms ammunition, and archaic field artillery. Very little industrial capacity was required to equip military forces with these weapons and munitions. However, World War I

introduced such things as aircraft, tanks, submarines, large sized field artillery, chemical weapons, an array of conventional bombs, and motorized vehicles. Combat had become mechanized because of the introduction of breech loading rifles, machine guns, and rapid fire field weapons. Naval shipping also benefited with the transition from sail to steam ships and the introduction of the submarine. Airplanes and tanks were effective because of advancements made to the internal combustion engine. All of these new items required steel, petroleum, and rubber. The industries supporting these advancements, along with the chemical producers, were thrust into prominence. This inventory of mechanized military power was completely reliant upon a responsive industrial base (16:19-21).

The US had the advantage of late entry into the war with most of its ammunition supplied by its allies. By the time the US entered the war the Allies' industrial capacity was producing as much as it could. The US brought into the war the greatest industrial capacity in the world, but it was geared almost entirely to producing civilian products. The most important problem for the US was to transform the industrial base into military production (16:19-21). Although there was ample time to develop US munitions production capability before committing our forces to battle, the quantity of ammunition produced by the US during the war was small compared to that produced by either our allies or our adversaries (25:1). Our late entry into the

war should have given us the advantage of building an industrial production base capable of completely supporting our military forces when we finally did enter into battle. However, that was not the case. Military planning and foresight was weak. The Army did not have plans for organizing or equipping a large, mechanized force and it did not develop planning factors for calculating force requirements. Through most of the war the Army fought with guns, airplanes, and munitions purchased from France and Britain.

Between April 1917 and June 1918, we spent $4 billion on artillery pieces and ammunition production. Of the 50,000 artillery pieces produced, only 143 actually reached the front lines before the war's end. Another example was the 23,405 tanks ordered, of which none were received for training or combat by the end of the war (35:5). Of the 1,741 ships ordered, only 107 were completed before the Armistice on 11 November, 1918 (14:4).

These examples highlight the inability of the pre-World War I military leaders to anticipate the transition of the military to a highly mechanized, mobile fighting force. They were better prepared to fight an out-of-date war on horseback. It should be noted that had the war lasted several more years the US contribution from industrial production would have been much greater because the production machinery was operating and overcoming lead times when the war ended.

Post-World War I

After the war, the country's leaders sensed a change to the way in which future battles would be fought. A highly mechanized military force, dependent upon industry, was here to stay and would require a combination of military, political, and civilian cooperation to be effective. Seeing that a national plan of industrial preparedness was nonexistent, reformers set out to create a mobilization policy based on the lessons learned from World War I.

The National Defense Act of 1920 was the first step toward legislating reform. It delegated to the Assistant Secretary of War the responsibility for mobilizing industrial organizations and for acquiring war materiel. Throughout the 1920's, three industrial mobilization planning agencies were created: (1) the Industrial Planning Branch in the Office of Assistant Secretary of War; (2) the Army Industrial College; (3) and the Army and Navy Munitions Board.

The Planning Branch was responsible for procurement and for developing broad industrial mobilization plans to support wartime requirements. The Army and Navy Munitions Board was responsible for coordinating munitions planning. The Army Industrial College was responsible for training officers from the Army, Navy, and Marines in procurement and industrial mobilization and supply issues. The government delegated the task of planning for future industrial mobilization needs to these three agencies.

The Planning Branch produced several Industrial Mobilization Plans (IMP) which were published in 1930, 1933, 1936, and 1939. However, they met with strong criticism from Congressional leaders and the industrial communities because they called for a government agency to nationalize industry during emergencies. It was through the coordinated efforts of the Munitions Board that the final plan in 1939 gained general acceptance in professional circles. However, other organizations and groups continued to oppose the plans. Pacifist and isolationist groups called the plans a blueprint for fascism (14:6).

Another reason why segments of the population were reluctant to give such broad powers to the military was because of Congressional investigations into some business transactions conducted between the military and the industrial community during World War I. Between 1930 and 1939, Senator Nye of North Dakota, organized a committee to investigate charges that many businessmen, who were thought to have selfless motives in conducting business dealings with the government, actually were responsible for "unconscionable profiteering and questionable practices". Investigations revealed that ledger book balances were more important than the nation's fate. Once these facts were made public, Nye's committee drafted legislation requiring the government to fight future wars without borrowing the money to finance the effort. It was hoped this action would remove the profitability of industrial leaders. However, opponents

said this action would lead to a dictatorial form of government during war, and it was rejected (34:78).

This general resistance to national control in wartime created a condition in which the IMP's were never fully implemented. Although never implemented to the degree to which they were designed; the structure, procedure, and philosophy behind the plans were never totally forgotten. They remained as an idea in the minds of logisticians and the plans which evolved during World War II were very similar to those of the 1930s'. The initial plans were later credited with shortening the industrial mobilization time during World War II and influencing the thoughts of planners of these days. For example, in 1943 the government, after struggling with a succession of agencies to control the war time economic buildup, created the Director of War Mobilization who was given centralized control of the economy. This agency was very similar to what IMPs from the 1930's had suggested (14:6-9).

It is important to note that in the period between the two world wars the nation lost it's zeal for military reform. Isolationism, low military budgets, and the massive blow of the depression caused concern for military readiness, defense preparation, and war planning to plummet. Very little was done in the 1920's and 1930's to improve the military capability of the United States. We dismantled much of the commercial arms base, leaving only a few government-owned arsenals and munition plants in condition

to support increased production. This condition was to be repeated in our post-World War II history. A report issued by the US Army Chief of Ordnance states the degree of readiness of the munitions industry at the time World War II began. It showed the consequences the nation paid for not applying the effort to improve the industrial base after World War I:

> During the years of peace, there were but meager appropriations for keeping research up-to-date and for planning to meet a national emergency. And the techniques and "know how" of World War I were inadequate for the highly specialized mass production of World War II (14:37).

According to historian George Lincoln, there were six lessons the nation was to learn from industrial mobilization in World War I. There were as follows:

1. Such wars require a total economic effort.
2. A war economy requires government control.
3. Careful allocation and adjustment is necessary to prevent shortages of critical items.
4. Economic interdependence with allies is inevitable.
5. The numbers and complexity of modern weapons require long lead time and expensive preparations.
6. Prior provisions of stores are necessary to support combat until new systems can be produced.

Lincoln questions whether these lessons were properly learned by stating: "the principles demonstrated by World War I were generally lost sight of, disregarded, or even violated". And he concluded that "we did not learn very well" (14:5). History would soon prove Lincoln correct in this assessment of the nation's military industrial preparation.

## World War II

The world had little time to recover from World War I before the next war once again engulfed the globe. By 1935 Germany and Japan showed aggressive tendencies on opposite sides of the world. In the Far East Japan expanded its military forces into Manchuria. Although the US was concerned about this, our government thought Japan would confine its actions to that part of the globe. The only people who seemed seriously concerned about Japan's growing military force was the Navy. It began to consider the possibility of war in the Pacific and planned the size of the fleet it would need and the islands from which it would conduct operations. The Navy was a separate organization from the War Department and both agencies had clearly defined areas of responsibility. The Navy acted and planned more or less unilaterally and did not include the War Department in its Pacific theater war plans.

On the other side of the world, Germany, held in check by post-World War I restrictions on rebuilding her military forces, never gave up on the idea of expanding its borders. In the post-World War I era, the nation developed quasi-military organizations to train and organize people for the military. Organizations such as mountain climbing and glider clubs were fronts for military training. The German government began to freely express its strength by openly defying the 1918 Armistice restrictions.

Up to this time the people in the US did not consider either country's actions a threat to our nation. It was not until 1 September 1939, when Germany invaded Poland, that US citizens felt the pressure of inevitable military action. England and France were immediately drawn into war with Germany and they, along with India, South Africa, Australia, New Zealand, and Canada, soon declared war on Germany. By the spring of 1940 Germany had forced British and French forces into a pocket on the Northwest coast of France at Dunkirk. The heroic evacuation of Allied forces from Dunkirk saved them from capture, but massive military equipment losses occurred because the equipment had to be abandoned. Germany had employed its forces with such speed that it literally ran over opposing armies. Germany's battlefield success was called blitzkrieg, or lightning war. With this type of success political and military leaders across the world were forced to recognize the importance of planning and preparation for military operations. No longer would logisticians have time to prepare as they had in the past because the speed of conflict had increased tremendously (23:6-10) (24).

These actions shocked Congress and the American people. With US involvement in the war growing more likely everyday, and an ineffective industrial capacity restricted by the depression and our isolationist beliefs, President Franklin D. Roosevelt used the Lend-Lease Act of 1941 to energize production of materials required by England and France. Our

industries were used to supply the Allies war materials built to US military specifications while we developed further plans to increase our industrial capacity in munitions and other war production. This gave our industries a very welcome head start on industrial mobilization before we were actively involved in the war following the Japanese attack on Pearl Harbor on 7 December 1941. The nation's industries required up to three and one half years to reach full scale production. For example, munitions peak production was not realized until mid-1944, almost five years after the demand had begun with Germany's invasion of Poland.

Realizing the low capability of our military, the Congress enacted our nation's first peace-time conscription act in September 1940. The "draft", as it was called, brought in an initial 100,000 men who had to be uniformed, armed, fed, housed, medically cared for, and trained. Thus, the impetus for military production came from our needs in addition to our efforts to support Britain and France. A primary need was munitions and the weapons with which to train the conscripts. Had industrial mobilization plans of the 1920's been funded and followed, the country's response time to the war's demands would have been greatly reduced.

When the government was ready to start munitions production it relied on only six government-owned and operated arsenals which had not been upgraded since World War I. The military had few regular ordnance officers.

Further, the military forces did not have civilian managers and technicians knowledgeable in munitions production who were capable of managing production efforts on such a large scale. By the time Pearl Harbor was attacked there were dozens of munitions plants under construction across the US and at the war's end there were 84 munitions plants in full scale operation. The government had adopted the concept of government-owned, contractor operated (GOCO) munitions plants which remains to this day (25:1-2).

World War II was a war of mechanized mass. Thousands of vehicles, ships, aircraft, and weapons were produced. Most of the war's combat support depended on these mechanized weapons. The military forces could not function well without them because the enemy was mechanized also. To present an idea of the degree of dependence to which the nation relied upon industrial production, consider the quantities of materials listed in Figure 1 which were produced for the war.

As part of the war-time build-up the government created a series of agencies to plan and implement mobilization, culminating with the Director of War Mobilization in 1943. This office was given central control of the economy in a manner similar to that envisioned earlier by the Industrial Mobilization Plans of the 1920's. In the three to four years of mobilization planning, the approach to managing the civilian sector's involvement in the military buildup evolved from the use of incentives, to persuasion, to

Major Weapons Systems

10 battleships
27 aircraft carriers
88,000 tanks
110 escort carriers
45 cruisers
358 destroyers
504 destroyer escorts
211 submarines
310,000 aircraft

Weapons

41,000 guns and howitzers
750,000 rocket launchers and mortars
2,680,000 machine guns
12,500,000 rifles and carbines

Ammunition

29,000,000 heavy artillery shells
100,000 16 inch naval shells
645,000,000 rounds of light gun and howitzer shells
105,000,000 rocket and mortar shells
40,000,000,000 rounds of small arms ammunition

Transportation Equipment

46,706 motorized weapons carriages
806,073 2.5 ton trucks
82,000 landing craft
7,500 railway locomotives
2,800 transportable road and highway bridges

FIGURE 1: INDUSTRIAL PRODUCTION FOR THE ARMED FOPCES DURING WORLD WAR II (14:8)

governmental regulation, and ultimately to strict governmental controls (14:7-9).

Post-World War II

World War II combat ended in August 1945, and President Harry S. Truman stopped Lend-Lease shipments in December 1945. US forces had huge stockpiles of almost any supply item required. However, massive, rapid demobilization foiled the plans for the wrap-up of war-time supply sites and left great quantities of military materiel in a large number of locations world-wide.

Political and military leaders again saw the need to document lessons learned in World War II. They established national policies to support a constant state of industrial readiness. In 1947 the military services saw sweeping changes to the national defense structure brought about by the National Security Act of 1947. It created the National Military Establishment (NME) with three military departments, including the new US Air Force, and a Secretary of Defense in an attempt to organize the military services for peacetime as close as possible to the organization considered to be required for war.

The importance of war reserve stocks as a buffer to industrial production was recognized. The reserve stocks were to serve as a buffer to keep combat units supplied until industrial production could keep pace with expenditures. A plan was drafted to connect the industrial

and civilian mobilization policies through the re-creation of the Munitions Board. The Board developed an Industrial Mobilization Plan which was similar to those created after World War I. The IMP's of the 1930's had never been fully implemented during World War II, but had been used as guidance. Now they were seen as valuable for setting framework for the new plans of the post-World War II Munitions Board. It was here that the nation benefited from the efforts of military reformists following World War I.

The new planning set out three phases of industrial production. Phase I was always in effect, extending from peacetime to that point where the President decides the nation must start mobilizing. Unique to this approach was the fact that military and political leaders now realized the nation must maintain a level of industrial capacity at all times; a warm production base. They could no longer wait to mobilize at the time war is declared and hope to sustain high levels of combat support; long lead time and the increasing use and complexity of technology would prevent that. Phase II began when mobilization was declared by the president and lasted until Congress declared war. Here the plans, programs, and procedures developed in Phase I were implemented. Phase III started when war was declared and continued until war efforts ceased. An important characteristic of this industrial plan was that national leaders now realized the importance of the public's support to make it work (35:8-10).

As part of the "lessons learned" attitude that came to dominate government thinking after each of the world wars, the nation's leaders once again decided to maintain the munitions industrial base at predetermined levels. In the post-World War II period they decided to initially fund a continuing munitions production effort of $1.8 billion. Maintaining plant funding was designed to keep that warm production base and enable plant managers to begin large munitions production activities within four to six months of Phase II being declared. The objective of all of this was to achieve full war-time production within eight to twelve months maximum time.

As well meaning as these actions were, they would follow the same course as past reform actions. As in the case of post-World War I decision making, funding was not maintained due to "economic measures". There were inadequate appropriations from Congress along with personnel shortages. As a result, the remaining munitions plants quickly deteriorated (25:106).

World War II had ended abruptly with the nuclear attacks on Hiroshima and Nagasaki. Plans for the wind-down of the war could not be used and munitions deliveries continued for many months even though the munitions were no longer needed. The result was a massive accumulation of excess materials, munitions being only one example. Because excess munitions stocks were plentiful after the war, the government did not see the need to maintain munitions

production capacity at the planned post-war levels. For the munitions industry, the end of World War II caused a sudden end to heavy production. Fortunately, there remained large amounts of munitions in theater and depot storage, in transit, and as work-in-process. A total of 8 million tons of munitions, valued at approximately $8 billion, was available to the military. Because of this stockpile, the government purchased only very minimum amounts of munitions between the end of World War II and the start of the Korean War (11:67-68). As a result, government agencies dismantled government owned facilities and sold machine tools as part of the post-war industrial demobilization. In the period between World War II and the Korean War (1945 to 1950) the government closed many plants, leaving only 38 of the original 84 war-time controlled munitions plants available. Most of these required complete rehabilitation. The time needed to start production was estimated to be 13 months. Had it not been for the large World War II surplus stockpile of munitions remaining in inventory the situation would have been much worse for our next involvement in war which occurred in Korea on 25-26 June 1950 (25:4).

By 1950 the nation had improved it's post-World War II industrial preparedness posture from what it had been in the post-World War I period, but it had failed to fund the industrial base at a level sufficient enough to meet the goals established immediately after the war by the Munitions Board (14:10).

## Korean War

The period between World War II and the Korean War saw the Soviet Union establish itself as a world superpower. It's domination over Eastern Europe and its announcement of a nuclear capability forced the US to reevaluate its approach to dealing with Soviet expansionism. The Soviets were quickly becoming a force capable of challenging America's world leadership position as the strongest nation on earth. They also had a major role in shaping the future of the Korean people.

At the end of World War II, the United Nations asked the Soviet Union and the United States to accept the surrender and disarming of Japanese forces in Korea. The nation was divided at the 38th parallel with the communist philosophy influencing the North and democratic values guiding the South. The United Nations had no intent to divide Korea into two separate countries, but Soviet influence in the North was strong. Eventually the Soviets blocked commerce and travel across the parallel. A communist government took control in the North while, in the South the Republic of Korea was formed and recognized by the United Nations as the formal government. The Soviet-armed and supported military forces of the North frequently raided the South and created turmoil and a need for protective military forces in the South.

On 25 June, 1950, the North Koreans invaded South Korea. The US saw this as more than just a regional

conflict. It was perceived as a step in the Communist's attempt to expand their influence across the globe. For this reason the US felt compelled to support the South Korean forces. The United Nations asked its member nations to support and help the Republic of Korea maintain its independence. A number of nations provided support to the civilian population and the military. At the request of the United Nations, the US accepted leadership of the United Nations military forces provided to assist the Republic of Korea in its fight for survival. The US was once again at war.

President Truman began a program of military build-up to counter both the Korean invasion and the perceived Soviet attempt to spread communism throughout the world. The US developed a military strategy dependent upon nuclear retaliation tempered with strong American and allied conventional forces in Europe. Truman's idea was to expand the US economy so it could support building the nation's military forces without causing inflation or degrading the US standard of living. The nation did not fully mobilize for the Korean War. Rather, it undertook a limited mobilization effort designed for the long term.

President Truman declared a national emergency seven months after the invasion and at the same time created the Office of Defense Mobilization to oversee all mobilization efforts. That office developed four goals consistent with the Truman policy toward Korea and the spread of communism:

1. Produce all military equipment needed for US forces, allies, and reserve stocks to last through the first year of a full-scale war.
2. Create additional production lines above those needed immediately for use in the event of full-scale war.
3. Develop basic resources and industrial capacity so that long run military objectives can be met and the economy can expand at the same time.
4. Maintain a healthy and productive civilian economy (35:13-17).

After World War II the government had very large stocks of munitions remaining at many sites around the world. However, they were not enough to last through the active warfare in Korea. Shortages occurred before the few munition plants maintained by the government could expand production. If the government had not earlier dismantled so many of the ammunition plants, and had not sold valuable machine tools in the post-World War II industrial demobilization, most of these munitions shortages probably could have been avoided. In fact, the Army estimated that if Congress had spent $10 million on the plants each year for five years, the US could have saved $200-$300 million on rehabilitation costs. Production demands in munitions plants expanded beyond the requirements of a limited war, but, as with the two previous wars, industrial production was slow to build but adequate by the war's end. (14:11-12).

The munitions shortages were especially critical for US forces. The terrain of Korea is very mountainous, making troop movement very slow; often requiring battles to be fought with field and ship artillery and air-delivered munitions. Also, when the Chinese entered the war in support

of the North Koreans, they brought overwhelming manpower into battle, causing US and UN forces to use greater rates of artillery fire and aerial bombing support in an effort to equalize their manpower deficiency.

Post-Korean War

Once again, at the end of the Korean War, the nation felt it had learned valuable lessons which should direct changes to the country's approach to military and industrial readiness. Leaders could now look back on three wars within a short time span in each of which the nation was unprepared to respond to the threats.

After the Korea War, the dominant theme was that past mobilizations had begun from a standing start. This resulted in lead-time delays before production could meet demand. With the increasing importance of airpower, and the speed with which it can influence a battle's outcome, this delay could be fatal to the US. A new concept of industrial preparedness was formed: the mobilization base. The idea was to maintain an industrial capacity which could rapidly expand to meet higher levels of production needs. This was similar to the warm production base advocated after World War II.

As with earlier plans, the new thinking called for industrial capacity planning to determine requirements, materials, facilities, skills, and tools needed for military production. Government facilities were funded for expansion.

Private industry received tax incentives to encourage facility expansion. The Defense Department issued directives to procuring agencies to integrate current production with industrial mobilization plans. The new concept proposed a balance of stockpiles and production capability. Forces should be able to fight on D-Day, the day that military operations began, with on-hand assets. These resources should last until P-Day, the point in time when industrial output reaches consumption rates. This was known as the D-to-P concept and was considered the most economical approach. It became the driving influence because it tied war reserve material quantities to lead times (35:45-48).

However noble the intentions and action of post-Korean War reformers, the result was similar to that of the past. The services used only a fraction of the money authorized for industrial preparedness. Orders to industrial plants continued to decrease until there were not enough to sustain production. By 1956 many production lines had stopped because of low estimates for future use. Later, during the Vietnam War, this condition negatively affected stocks of conventional bombs and created tactical problems in the combat areas. Only one tenth of the approved mobilization requirements for MK-80 series bombs, the newest type of air-delivered fragmentation bombs, were produced when the industry had the capacity to build them.

The Air Force did not support the D-to-P mobilization concept because it conflicted with the USAF philosophy of

Force-in-Being. This was based on the idea that the next war would be nuclear and would be fought only with the weapons on hand at the start. The Air Force attempted to meet military goals with a constant state of readiness and in-place logistics. Air Force war reserves were measured in days of utility. From 1956-1967, the Air Force did very little industrial readiness planning (14:15)(35:49-50).

Vietnam War

When World War II ended in 1945, the United States was the recognized leader of the world. With an industrial base and national economy left virtually untouched, but strengthened, by the war, the US was forced into a position of world leadership. The only threat it had to contend with was the Soviet Union. Soon after the war ended the USSR made it clear it intended to expand its borders and spread communist doctrine around the globe. To counter this, the US established the "containment" policy. A term first coined by George Kennan, the head of the Policy Planning Staff at the State Department in July 1947, containment was described as the appropriate foreign policy to adopt against the Soviet challenge. Kennan said the US should establish "a long-term patient but firm and vigilant containment of Russian expansive tendencies". He called for the application of "counter-force at a series of constantly shifting geographical and political points against Soviet action" (20:37). The containment policy was used to justify US

involvement in South Vietnam. However, long before the deployment of American combat forces in the 1960's, Japanese and French actions in Indochina would precipitate development and support for a communist government.

French involvement in the country was initiated by missionaries in the 17th century. Eventually French interests moved away from religion and were replaced by trading privileges as the primary reason for their presence. Ultimately it resulted in colonization and complete French domination of the country. In 1940, French domination was challenged by the Japanese invasion of Indochina. Initially, Japan left the French colonial administration intact. But, in March 1945, Japan took complete control of Vietnam.

It was during the Japanese rule that two Vietnamese men, Bao Dai and Ho Chi Minh, competed for control of their country. Bao Dai had been recognized by the Vietnamese people as their emperor since 1925, and by the Japanese as the puppet ruler. On the other hand, Ho Chi Minh was educated in France and Moscow and was a member of the communist party. He was recognized by the Vietnamese people as their "liberator" from foreign domination. He frequently conducted guerrilla operations against both the French and Japanese military.

After the Japanese surrendered in World War II they returned control of Vietnam to the Vietminh, the forces loyal to Ho Chi Minh. Bao Dai abdicated his power while Ho Chi Minh proclamed a provisional government in Hanoi with

Bao Dai as a "supreme counselor". The Japanese were defeated, but Vietnam was not free of French influence. France had intentions of reinstating colonial authority once again, and by 1946 they recognized Vietnam as a free state within the French Union. French troops returned to Indochina soil.

Ho Chi Minh and Bao Dai continued to compete for control over the country. In 1951 Ho Chi Minh declared that his Democratic Republic of Vietnam was the only legal government. It was quickly recognized by Russia and China. On the other side, the United States used the containment policy to justify its support for Bao Dai's government. Thus began the split of the nation into northern and southern sections and also the increase of military support to both sides.

Ho Chi Minh continued to develop a groundswell of support for his ideas. He proved successful against the French military. And on 7 May 1954 his forces won the battle for Dienbienphu, a battle which proved to be the end of French military presence in Vietnam.

Through the 1950's the US continued to funnel aid into Vietnam. In 1961 General Maxwell Taylor, acting as President Kennedy's special representative, and Walt Rostow, a civilian advisor, visited Vietnam. Upon their return they recommended increased military aid and the introduction of US advisory troops. By 1962 the Military Assistance Command, Vietnam (MACV) was established along with an increase in

military advisors from 700 to 12,000. From here on, the pace of US involvement increased dramatically. In February 1965, US bombing of North Vietnam began and, once again, the country was at war. As with the Korean War, no formal declaration of war was enacted by the Congress but the American men in combat knew it was war! By the end of 1965 over 200,000 troops were commited to contain communism and the number grew to a peak exceeding half a million by year's end in 1968 (17:670-680).

The industrial base was once again ill-prepared to meet the challenge; but it did not start out that way. In the post-Korean War period logistics planners once again saw the importance of maintaining a set level of munitions production capability within the industrial base. Large amounts of money, facility space, and equipment was designated to be maintained in peacetime. A total of $31.5 million was established to maintain standby munitions facilities. A minimum of 44.25 million square feet of floor space, and over 70,000 major production end items were identified for this purpose (25:106). However, by 1960, these funds were cut in half. And by 1964 the Department of Defense had abandoned it's mobilization ideas and put into effect an all-out austerity program. Ironically, this took place at the same time the US initially increased its military advisory activity in Vietnam.

By the end of 1965 the nation had commited large numbers of troops and large quantities of equipment to the

war effort. The munitions production base was not keeping track. It was estimated that ammunition production lines would not be producing at full capacity for at least 18 months (25:4). At the start of US military involvement in combat operations in 1965, US Air Force munitions stockpiles totaled 320,000 tons and were valued at $1.171 billion. This was over three times more than the war reserve material quantities required by the Air Force's operational plans. But, the Air Force would soon learn that, even with these quantities, shortages of critical items would be experienced in the war (11:68).

Several other problems arose which affected military support in Vietnam. In contrast to previous wars, a national emergency was never declared in the ten year span of this conflict. The country's mobilization planning, along with industrial controls, were to be initiated only upon such a declaration. This affected production decisions.

With respect to the support needed from industry, the political leaders in the Department of Defense established a policy of competitive bidding to help reduce the cost of the war. Procurement actions placed the war effort on an equal footing with commercial work, thus down-playing the urgency of earlier mobilization agreements with industry. This policy rendered ineffective all of the industrial planning the government had cooperatively accomplished with commercial industry (4:68-69).

The government also adversely affected production because it provided little incentive to industry to shorten lead times. In many cases, civilian companies were unwilling to give up confirmed commercial business and were reluctant to bid on government work unless it replaced idle plant capacity. Those producers who remained in business with the government after the Korean War (those who had plants, tools, machines, workers, and the experience to produce war material) were in many cases not awarded contracts because they were underbid by other firms. In these cases the government equipment in place at that plant would have to be moved to the lowest bidder's plant at government expense. It was this kind of business-as-usual attitude, and the failure to maintain adaquate funding for the industrial base after the Korean War, which developed civilian business' distrust of government promises and caused many of the production problems for the US in the Vietnam War (35:51-54)(14:15-16).

In effect, the government placed the war effort on an equal footing with, and in direct competition with, civilian industry and manufacturing. As the economy was growing during the 1960s, civilian producers were reluctant to support the war effort when there was ample business to be had without the restrictions of military specifications, government regulation, and federal oversight. When a company did get involved in producing war material, it was only when it had idle capacity. In many cases there was no motivation

to shorten lead-times because war material competed directly with civilian products.

The Industrial Mobilization Production Planning Program (IMPP) was a tool used by DOD to develop planning criteria between the government and civilian sectors for war planning. Its objective was to achieve adequate and responsive utilization of the nation's production cabability in wartime. As the IMPP existed in 1965 it did not do the job it was established for. Plans were not prepared for an undeclared war. The IMPP assumed the full cooperation and availability of civilian plants. To compound the problem, the Air Force adopted the concept of massive nuclear retaliation, or the concept of a short war, with all required war material in place at all times to successfully complete the conflict. This philosophy contributed to the lack of support for maintaining a warm industrial production base and also created conflict between the US military services, between the military and the business/industrial world, and between the leaders of the various elements of the DOD.

Another contributing factor to the problem was that prior to the Vietnam War the military's mobilization planning estimates were unrealistically low. This was especially true for munitions where loss of production lead-time resulted and money was spent trying to rebuild the neglected production base. For example, the plant producing MK-84 2000 pound bombs was dismantled just prior to our

combat involvement in Vietnam because it was classified as excess to requirements. However, the mobilization requirements were inaccurate. An additional 18 months was then required to reestablish this capability (10:113-116). As the war proved, the MK-84 bomb was used extensively by the USAF throughout the ten year war.

Finally, another problem which affected industrial mobilization was the unpopularity of the war with American citizens. Demonstrations were a sounding board for those who did not agree with US foreign policy, and many times this was directed at war production plants. Massive rallies were held outside plants in an effort to halt the movement of workers, delivery of supplies, and shipment of war goods. There were instances of production facilities being bombed. Draft evasion was a mean of expressing disagreement with the government. Many draft age men fled to Canada or other countries to avoid serving in the war. Television coverage of the conflict brought the horrors of war into the living room every night. It seemed that everybody in America had an opinion of the war. It polarized thought mostly on two extremes; people were clearly for the war or against it.

## Conclusion

It is easy to see that the United States government has not, overtime, effectively managed it's industrial production base. At the end of each war a few forward-looking individuals had correctly analyzed the

mistakes made, and had initiated actions to prevent the problems from recurring. But, with the answers in their hands, government and military leaders had too easily forgotten these lessons. They consistently cut funding for industrial production support. As a result, the nation entered the next war unprepared to support troops, either in the air, or on the ground, or on the sea, with the munitions and other vital weapons needed to conduct the war. Without being accused of applying 20-20 hind sight to this history, it must be stated that extreme and innovative measures were used to make sure military forces were ultimately provided with their essential war-fighting materials. These stop-gap, or crisis management actions were the only difference between success and failure for the military. This did not have to be the case.

War will always contain elements of uncertainty and things which could not have been predicted even with the most thorough planning and intelligence. The philosopher Sun Tsu said surprize and uncertainty can be used as a powerful tool against the enemy. However, it must be something which is employed against your enemy, not your own forces. It appears that in the 20th century, through four wars, American leaders have not learned the value of a responsive, ready, and technologically superior industrial base. We are guilty of building into our scenarios surprize and uncertainty for ourselves. Today, wars are fought with little time to prepare. If the US approaches the next war

with the same attitude toward industrial mobilization and readiness which we have had in the past we are destined to repeat the same mistakes for the fifth time; and perhaps the final time!

## III. Munitions Logistics Organizations

There were many organizations which supported US Air Force munitions operations in Vietnam either directly or indirectly. This chapter briefly discusses each of them. They include the following:

Office of the Secretary of Defense (OSD)
Joint Chiefs of Staff (JCS)
Pacific Command (PACOM)
United States Military Assistance Command, Vietnam (USMACV)
Headquarters USAF at the Pentagon (Air Staff)
Headquarters Pacific Air Force Command (HQ PACAF)
Air Force Systems Command (AFSC)
Air Force Logistics Command (AFLC)
US Army
US Navy
Military Sea Transportation Service (MSTS).
Military Airlift Command (MAC)

### Office of the Secretary of Defense

The Department of Defense, as it was organized at the time of the Vietnam War, had its beginnings as the National Military Establishment in 1947 with the signing of the National Security Act. This act created the National Military Establishment (NME), the separate Department of the Air Force, and the Secretary of Defense (SECDEF). The SECDEF was a cabinet position under the President as were the Secretaries of the Army, Navy and Air Force. The NME was an attempt to reorganize the military departments after World War II, taking advantage of the lessons of that war. It's purpose was twofold: to preserve the independence of the services, and to create unified control and direction for political and military policy. Up to this time military

leaders had played a key role in developing and implementing military policy for the government. This powerful military involvement concerned many civilian leaders and contributed to the perceived need for change.

Under the new organization the SECDEF was in a position of increased authority over the military services but in no more than a coordinating role. Interservice rivalry remained strong and military officials did not completely lose their authority over policy making. The 1947 act was ineffective in making all the changes many people wanted. The SECDEF was left virtually powerless to promote the change which the act originally called for because of his equal status with the three military department secretaries.

Many people were concerned the services were still too powerful so an amendment to the act was passed in 1949, changing the NME to the Department of Defense and further modifying the service's policy-making authority (1:53-54). The act established centralized control under the SECDEF and the general staff making the services semi-autonomous sub-divisions of the new executive department. The SECDEF retained cabinet status but the three military department secretaries lost theirs. The SECDEF was given greater powers over the military services. With this amendment power was shifting to higher levels in the DOD.

In 1958 Congress further restricted the power of the military services in policy making through the Defense Reoganization Act of 1958. The SECDEF was given much broader

control over the military departments. This was the beginning of the trend toward centralized civilian management and control at higher levels of the DOD; a condition which existed up to the nation's involvement in Vietnam (27:II-2-30). Figure 2 shows the functional organization of the SECDEF over the military departments during the Vietnam War. The new DOD organization became known as a dual-channel system, where authority over military units ran from either the logistic support channel or the operational command channel.

At the start of the Vietnam War the SECDEF had authority and control over munitions in all services through the use of the Five Year Defense Plan (FYDP) and the annual budget process. Direct munitions issues were delegated to the Assistant Secretary of Defense, the Comptroller, and Systems Analysis. The day-to-day management of munitions was the responsibility of the services. However, early in the war, the SECDEF assumed centralized management of munitions (11:26).

Joint Chiefs of Staff

Each echelon of the military structure had varying degrees of responsibility for logistics planning. The Joint Chiefs of Staff was the highest military structure which served this purpose. The JCS was composed of the Chief of Naval Operations, Commandant of the Marine Corps, and the Chiefs of Staff of the Army and the Air Force. The chairman

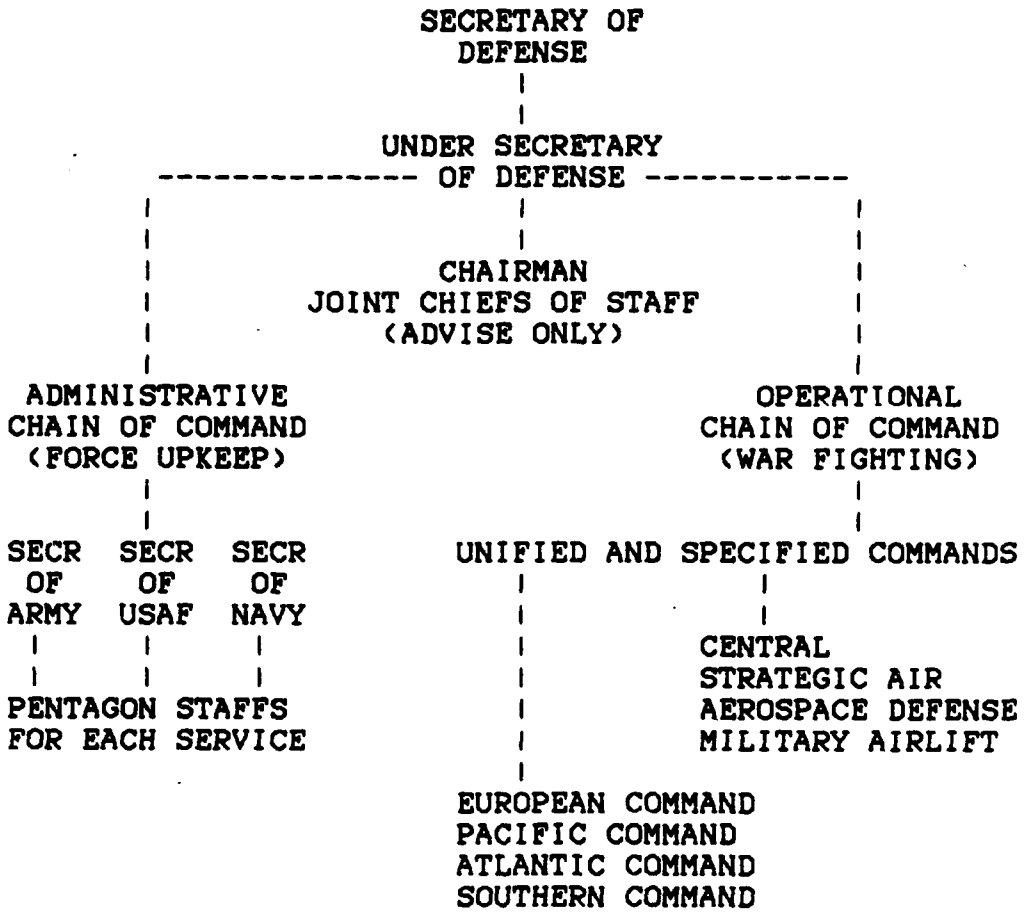


FIGURE 2: DUAL CHANNEL ORGANIZATION OF THE DEPARTMENT OF DEFENSE (10:17)

served as an advisor to the SECDEF and coordinator of the joint chiefs.

At the time the United States became involved in the Vietnam War, the JCS had relinquished most the the authority they had after World War II. However, they were responsible to the the SECDEF for several important functions. One of the primary functions was to prepare integrated plans for military mobilization including the assessment of logistics responsibilities in each of the services in accordance with the integrated plans. They were tasked to review the plans and programs of the commanders of the unified and specified commands to determine their adequacy, feasibility, and suitability for accomplishing assigned missions. The JCS also reviewed major personnel, materiel, and logistics requirements of the services in relation to strategic and logistics plans.

The JCS was responsible to the SECDEF for verifying the adequacy of the "Logistics Guidance", the annual baseline planning document used to determine support for the force structure, and to ensure the military services worked on common assumptions conforming to national policy objectives (10:10-11). The JCS involvement in munitions management was most evident when shortfalls were recognized in the early years of the war and in the various munitions reporting systems which were created to meet the needs of different agencies.

## Pacific Command

In the Vietnam War, US military forces of the Army, the Navy, the Marine Corps, and the Air Force were organized in a unified command under the control of a Navy Admiral stationed at Honolulu, Hawaii. His title was Commander-in-Chief, Pacific (CINCPAC). The person who filled the position of CINCPAC not only had authority over the Pacific fleet, but also over all US military forces in Korea, the Philippines, Japan, Guam, and Vietnam. For example, the commander had an Air Force four star general serving under him during the war as well as comparable officers of the other services. Thus, the title of unified commander. This meant that military forces from more than one branch of service were brought together to meet US national security objectives.

The CINCPAC played a direct role in munitions logistics during the period when munitions shortfalls threatened combat operations. He was given authority from the Joint Chiefs of Staff to assume control of all munitions in Southeast Asia regardless of service ownership.

## US Military Assistance Command/Vietnam

Under the command and control of the CINCPAC in Hawaii was the United States Military Assistance Command, Vietnam (USMACV). It was formed on 8 February 1962 and its mission was to control the activities and operations of the various US military services in the Republic of Vietnam. It was

disbanded in 1973. Early in it's inception military leaders debated about to whom the USMACV should report; directly to the JCS or through CINCPAC. Military leaders, and the US State Department, concurred that the USMACV should report through the CINCPAC because the CICNPAC was directly responsible for the entire Pacific region and would have to support Vietnam logistically (9:8-11).

In line with joint doctrine, the USMACV had operational control over all assigned and attached forces in Southeast Asia. It exercised control through the commanders of the US Army, the Navy, the Seventh Air Force, and the Third Marine Amphibious Force. For example, in October 1961, the USMACV directed the US Navy to complete 38 military construction projects across Vietnam which accounted for an expenditure of over $823 million. One of the outputs of the efforts was the conversion of over one million barrels of petroleum, oil, and lubricants storage to 3.8 million square feet of ammunition storage (9:10-46).

However, the USMACV did not excercise complete control of Air Force munitions matters in Vietnam. Except for operational control, the Seventh Air Force came under the Commander-in-Chief, Pacific Air Forces (CINCPACAF). Thus, on logistics, administrative, technical, and other matters soley of Air Force interest, the Seventh Air Force commander in Saigon took orders from and dealt directly with the CINCPACAF. With respect to daily logistics matters, the COMUSMACV had little direct impact upon Air Force munitions

operations other than in a coordinating capacity. The status of the other services' organization paralleled those of the Air Force. The USMACV enforced the unified chain-of-command structure. But, at lower command levels, military service organizations maintained unit and service integrity. To assure interservice coordination in the field the USMACV set up a hierarchy of officials whose task was to coordinate certain designated functions performed by two or more services or free world forces in a specific geographic area (7:155-156). This author found little material to support major USMACV influence upon the US Air Force munitions logistics over and above what the Seventh Air Force accomplished. However, it remained as a command structure within the Pacific theater and its accomplishments with other military services were tremendous.

Headquarters USAF

As with the other military services, the Air Force had its contingent of staff personnel working at the Pentagon in Washington DC. Although the Joint Chiefs of Staff were the focal point for military planning, the Air Force Pentagon staff, with representatives from each of the functional areas of Air Force structure, also participated in planning. HQ USAF helped prepare JCS plans and assured the USAF view was included in the DOD and the JCS planning guidance. Figure 3 shows the chain-of-command from HQ USAF through the numbered air forces in SEA.

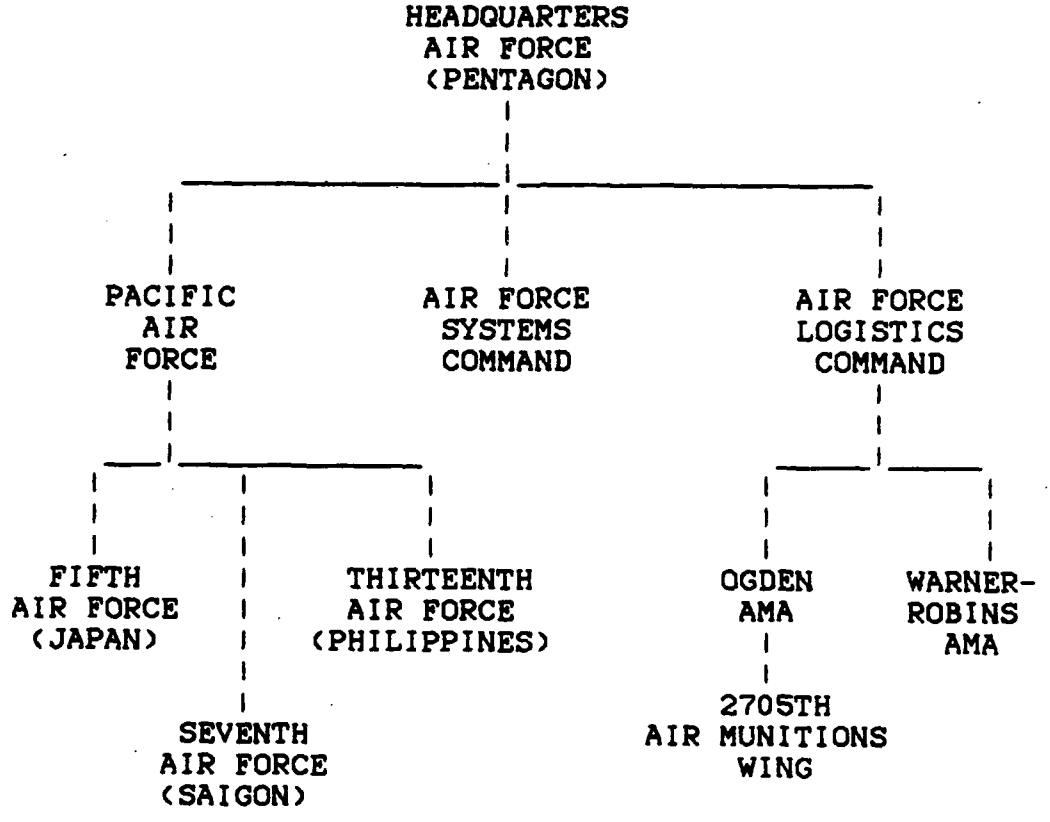


FIGURE: 3. HEADQUARTERS AIR FORCE
MUNITIONS ORGANIZATIONAL CHART
(10:33)

The staff was involved not only in munitions planning, but, also, in calculating war-time requirements, budgeting actions, prepositioning of war reserve munitions stocks, personnel actions, and other functions related to future plans and the day-to-day management of munitions units through the various Air Force major commands.

One of the biggest tasks facing USAF staff personnel was the resolution of munitions shortages at the beginning of the war. As will be shown in the next chapter, the centralization of munitions management authority to higher levels within the chain-of-command was one of the actions taken to solve the problem. The Air Munitions Office (AMO) within the Department of Defense was an agency created to centralize munitions decision-making authority. This office was created with manning help from HQ USAF.

Another activity which the USAF Pentagon staff was involved in was deciphering and reconciling munitions balances on the variety of reporting formats created to track munitions shortages. Also, it should be mentioned, many of the actions taken by the AMO to resolve munitions shortages were already in process or had been recommended by the USAF Pentagon staff before centralization took place.

Although much of their authority was taken away during the war the staff remained active in all facets of munitions operations from munitions and manning shortages to post-war stockpile planning and budgeting actions. The USAF Air Staff

remained instrumental in munitions operations during the war.

Headquarters Pacific Air Forces

Another logistics organization in the munitions chain-of-command was the munitions staff at HQ Pacific Air Command (HQ PACAF). This organization was directly responsible for munitions operations and was the authority over the Seventh Air Force and its subordinate Air Force organizations.

The munitions staff consisted of senior officers and enlisted personnel who were representatives from each munitions specialty function. They included aircraft weapons loading, munitions assembly and storage, explosive safety, munitions supply, and explosive ordnance disposal. They were the munitions staff experts on whom the CINCPACAF relied for his munitions actions and effectively aided in resolving munitions problems in Vietnam.

Air Force Systems Command

The Air Force Systems Command, is located at Andrews Air Force Base, Washington DC. As a support command under the USAF it was responsible for the acquisition of all weapons sytsem equipment the Air Force introduced into service. The AFSC's role was to define Air Force requirements for all classes of equipment and to supervise each stage of acquisition including manufacturing. It had complete development responsibility for new weapons systems,

including advanced technology, development, test, procurement, production, configuration, and site activation. It qualified newly developed weapons systems and equipment for Air Force use (13:113). Figure 4 shows the munitions organizations of the Air Force Systems Command.

Distinctions must be made as to what the AFSC did not do. The subordinate military divisions under the control of the AFSC did not directly manufacture military equipment. This was done by private contractors. Nor did the command carry out direct research and development. Although the Air Force maintained and operated laboratories which did some basic research, the majority of laboratory efforts were contracted to civilian agencies. The command did not build the prototype or conduct detailed systems engineering of major weapons systems such as aircraft or missiles. This also was contracted-out to civilian companies.

There were four divisions within AFSC which supervised the acquisition, management, and manufacturing processes. They were: the Space Division, the Electronics Systems Division, the Aeronautical Systems Division, and the Armament Division (18:167-180).

During the Vietnam War, the Armament Division (AD) was responsible for managing all new munitions development programs and for modifications to existing munitions in support of air operations in Southeast Asia. Munitions development included exploratory and advanced development. Modifications to existing munitions, such as the MK-80

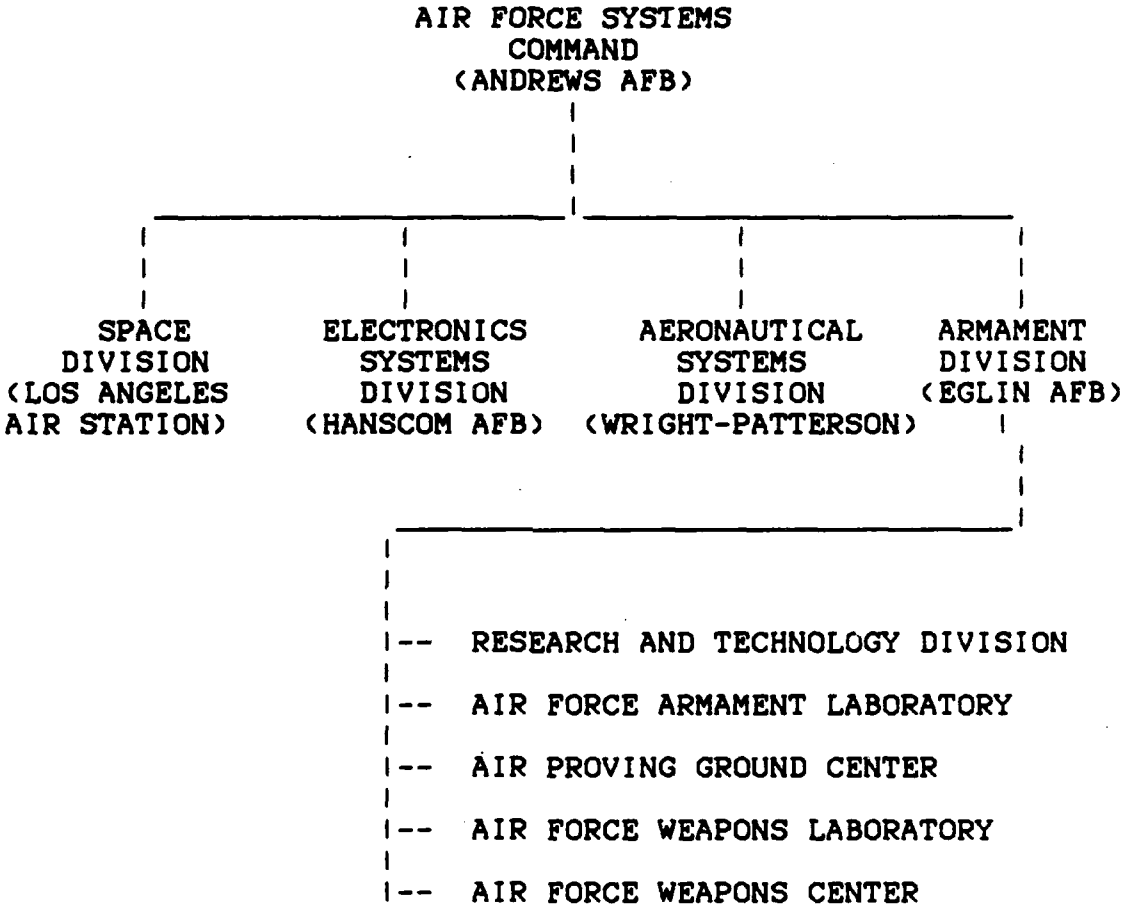


FIGURE 4: AIR FORCE SYSTEMS COMMAND
MUNITIONS ORGANIZATIONAL CHART
(18:168-173)

series bombs converted to laser guided weapons, were an important function of the Armament Division. It reduced the research and development requirements enabling improved munitions to be fielded faster. It also lowered the cost of developing and fielding new munitions.

Munitions research, development, testing, and modification was done through the five organizations explained below:

1. Research and Technology Division
2. Air Force Armament Test Laboratory
3. Air Proving Ground Center
4. Air Force Weapons Laboratory
5. Air Force Special Weapons Center

Research and Technology Division. The Research and Technology Division at Eglin AFB Florida, was an AFSC agency responsible for managing new technology programs in exploratory and advanced development leading to new application and improvement of munitions concepts, improvement in the state-of-the-art technology, and demonstration and feasibility of proposed new munitions for future application. Some examples of the Division's applications was their testing and development of the 20MM gattling gun system for new jet aircraft and modification for existing aircraft; installation of the 40MM and 105MM guns on the AC-130 aircraft and the application of laser technology to the MK-80 series fragmentation bombs.

Air Force Armament Test Laboratory. The Armament Test Laboratory at Eglin Air Force Base in Florida was the

primary research and development organization for munitions. Its mission was to plan, organize, present, and execute exploratory and advanced development programs for non-nuclear munitions for the Research and Technology Division. Nuclear weapons were controlled by the Director of Special Weapons, at Kelly Air Force Base TX, and Kirtland Air Force Base NM. Although plans were drafted for the application of special weapons in Vietnam, they were never seriously considered for use.

The Armament Test Laboratory was the central point of information on munitions developments in the AFSC. Its engineers were responsible to ensure rapid application of the latest technology to new munitions and major weapons systems. In many cases, test and development of new or modified munitions would be done concurrently with initial aquisition. In these cases the Directorate of Munitions, at the Aeronautical Systems Division, Wright-Patterson AFB, was responsible for the overall program. Once initial acquisition and standardization was completed, full procurement and follow-on engineering responsibility was transfered to the Air Force Logistics Command (5:5-6).

Air Proving Ground Center. Also at Eglin AFB, the Air Proving Ground Center provided test support to the Armament Test Laboratory. It was responsible for conducting weapons effectiveness testing and scoring test results of bombing range drops. For example, development and testing on AC-130

gunships and the new laser-guided weapons systems mentioned above were important additions to the Air Force mission capability during the war. Testing conducted at the Air Proving Ground Center laid the foundation for these programs to be incorporated into the war effort in Vietnam.

Air Force Weapons Laboratory. Created in 1963 to augment the Armament Test Laboratory function at Eglin AFB, the Weapons Laboratory was responsible for advanced development and testing associated with nuclear weapons and the new laser and directed energy munitions. However, its greatest contribution to the munitions field in the Vietnam War was development and testing of improved aircraft bomb racks; bomb compatibility testing; and ground handling equipment interface with munitions and aircraft.

Air Force Special Weapons Center. The AF Special Weapons Center, Kirtland Air Force Base NM, provided support to the Weapons Laboratory in the form of nuclear weapons development and support. Although it did not contribute nuclear support directly to the Vietnam War, it provided an important element of information exchange on items such as aircraft suspension and release equipment, weapons compatibility with the aircraft, ground handling equipment support, and weapons delivery techniques, all of which were similar to conventional munitions support.

These five organizations of the AFSC were responsible for developing munitions using the latest technology.

However, they were augmented by another organization whose only job was to solve problems created as a direct result of air operations in Southeast Asia. In July 1967, the AFSC created the Directorate of Technical Applications for Southeast Asia (TAFSEA). TAFSEA was assigned to the Air Proving Ground Center, and its function was limited to solving problems which lent themselves to quick fix solutions.

Another way in which the Armament Test Laboratory supported the war was to assign liaison officers to South Vietnam. Assigned to an AFSC Detachment at the Seventh Air Force in Saigon, these technical representatives contributed to new munitions development and to modification of existing munitions. They were familiar with the technology and its application to the munitions introduced to the theater. They helped develop and engineer the new and modified munitions at the Armament Test Laboratory. They provided the on-site solutions to problems encountered in weapons employment. The representatives were able to analyze the problems in the actual combat environment, assess personnel capability, and provide technical improvements in the design of future weapons. Also, the Armament Test Laboratory provided scientists to the Military Assistance Command, Vietnam (MACV). Their purpose was to work with the Chief of the Office of the Science Advisor to the commander of the MACV, to study and evaluate on-scene weapons application, and

develop corrections and modifications to munitions problems (1:1-4).

Munitions Development Problems. Munitions development in the AFSC was not without its problems at the start of the war. The Air Force Systems Command was not prepared to accomplish full-scale testing and development of munitions for new jet aircraft and Vietnam operations. The problem revolved around the overall national policy of massive nuclear retaliation. The Air Force planned to fight the next war with nuclear weapons; it was to be a short duration war without conventional munitions. This stopped most of the AFSC's effort to develop new technologies. The command put little emphasis on developing new munitions capabilities in the period between 1958 and 1962. Personnel in the Armament Division were dispersed into other fields during this period. The command did nothing to generate an evolving body of trained personnel who could continue munitions development and testing. Compounding these personnel shortages in skilled personnel was the fact that the Air Force was forced to rely upon civilian industry for research and development on munitions technology. This was caused by a lack of qualified personnel, restricted funding for in-house research, and the lack of facilities in the AFSC. Without the knowledge or experience to evaluate munitions development the Air Force could do little to guide the efforts of the Army or civilian industry. Since munitions

technology had little application to the civilian community it was imperative the military have a solid research and development base from which to guide future munitions actions.

The AFSC recognized the need to rebuild its munitions capability. The policies followed up to 1962 created severe constraints which had to be overcome. In November 1962, the Vice Commander of the AFSC, in a letter entitled "Limited War and Counterinsurgency Support", recognized that the change in military strategy from massive retaliation to flexible response would require the command to change its emphasis and its methods of operation to support the new strategy. The Vice Commander directed that:

> aggressive action be taken within the Command to accomplish all research, development, testing, and evaluation efforts necessary to provide the Air Force with the capability to carry out the limited war and counterinsurgency missions. A well balanced plan must be prepared by a Task Force to define the role of AFSC in this area. This planning effort is to be a Command-wide task (2:1-4).

By 1964 the command had taken actions to begin munitions development once again. But, because of the lack of new development in the period prior to this, munitions production was being accomplished under severe time constraints. These constraints did not permit the extensive safety, reliability, effectiveness, and employment testing which normally accompanied new munitions development. Risk factors, which could be "engineered out" of the munitions, were now a part of them up to the point of employment in

combat. Costs were excessive. Management was forced into concurrent development and production without the normal evolutionary process of testing and correcting deficiencies.

Other problems resulted from the lack of munitions development. From a procurement standpoint, the compressed time frame in munitions development decreased the government's ability to use competition. In most cases the only choice available was sole source contracting. When fixed price contracting was used it was with the understanding that many adjustments would be required due to inherent engineering changes.

For the developer, the major objective became the meeting of milestones. Engineering changes impacting on production were not acceptable. Changes caused delays in production which caused increased costs. This ultimately caused problems in other programs. These problems flowed into munitions testing and evaluation. When a malfunction was discovered, production lines were stopped until the problem was corrected. This created pressure for quick evaluation and application of hasty solutions. If the testing and evaluation period was short, acceptance of the munitions by the user was difficult, further compounding the problem.

From 1965 through 1968 there was a continued increase in funds for munitions activities. However, the increase went to fund procurement of currently developed munitions rather than development of new munitions. And, to compound

the problem, when the development effort was funded it went mostly to improving existing products (2:1-4).

In his book The Pentagon and the Art of War, Edward Luttwak echos some of the same critisisms of the Armament Division's actions in the Vietnam era. He said senior officers and engineers were to blame for the loss of important military capabilities because they prevented new munitions from being produced. The problem centered on the desire of senior leaders in research and development offices not to put themselves out of business by declaring their work completed and ready for production. Of these people he said:

> The Eglin remedy is simple: having worked hard for as many years as possible to develop the best possible munition, instead of certifying the project as completed and ready for production, the Armament Division suddenly uncovers new and wonderful technical possibilities, wholly new thresholds of performance, and thus repudiates the ready-for-production munitions as "less cost-effective", so everyone concerned can happily start at the beginning all over again (18:177).

Examples Luttwak offers to back up his assessment of the Armament Division are the Durandal runway penetrating mine and the Wide-Area Antiarmor Munition (WAAM), designed as a tank killing weapon. He said that since the early 1960s the AFSC probably had drawings of the Durandal but continually delayed its production by rejecting each improved version, thus leaving operational units without an important runway pentrating capability. With regards to WAAM, he said that the concept for a munition capable of opposing advancing enemy armored attacks had begun in the

early 1960s. At that time the Armament Division set out to design such a weapon in the form of sub-munitions or bomblets; a simple design with only a few working parts which could malfunction and a design relatively inexpensive to produce. By 1970 the Eglin engineers had designed the plans and were ready for production. However, they rejected it themselves in favor of a new, more complex design with which the submunition could lie dormant until it sensed the target approaching. It could determine the direction and range of the target, pop up off the ground, and fire a projectile to destroy the target. This design eventually gave way to a third stage design which continued up to 1985 (the year Luttwak's book was published) without receiving production funds. He said these events were more than simply bureaucratic inevitables. They were the deliberate holding back of innovation for the sake of greater innovation in theory and it had a serious impact upon the overall military balance (18:176-179).

Air Force Logistics Command

The Air Force Logistics Command was a support command under Headquarters Air Force at the Pentagon. The AFLC performed logistic management functions, including determining quantitative materiel requirements, buy and budget programs, inventory control, storage, distribution, maintenance engineering, technical services, and disposition of Air Force managed materiel (13:113).

The operating agencies under the AFLC included five Air Material Areas (AMA). Each of the AMAs performed the following functions for the supply classes for which they were responsible: systems management, item management, federal class management, packaging, transportation, materials handling management, inventory control point functions, and the purchasing, storage, and distribution of centrally procured stock for their specific areas of responsibility (13:117).

The commander of the AFLC retained overall responsibility for munitions procurement, production, transportation, supply and storage, and interservice coordination. The AFLC procured munitions primarily from the Army and the Navy. These tasks were accomplished at the Ogden and Warner-Robins AMAs. The Ogden AMA was responsible for ammunition items such as bombs, bullets, cluster bomb units, and aircraft ejection seat components while the Warner-Robins AMA managed aircraft guns, gun systems, and air launched missiles. Although the Warner-Robins AMA performed important tasks, the majority of the munitions support from the AFLC came from the Ogden AMA. This was demonstrated by the munitions transportation system created to overcome munitions shortfalls in the early years of the war.

The Munitions Division. Under the Directorate of Supply, located at Headquarter AFLC, at Wright-Patterson

AFB, was the Munitions Division. The Division was activated in March 1962 and was the sole agency responsible for overall Air Force munitions management below the Air Staff level. This functional organization provided a single point, centralized management concept for the two munition's AMAs. However, as the war in Vietnam progressed, new, and more sophisticated aircraft were introduced into the Air Force inventory and into the combat units in Vietnam. They changed the technical aspects of munitions, requiring reengineering to make them compatible with the aircraft. This caused the AFLC to change responsibility for munitions away from the Directorate of Supply to the Maintenance Materiel Division under the Headquarter AFLC Directorate of Maintenance Engineering (5:7-8).

2705th Air Munitions Wing. A sub-function under the Ogden AMA was the 2705th Air Munitions Wing. It was created in January 1960 and was composed of civilian and military munitions technicians capable of performing explosive ordnance disposal, safety and inspection duties, inventory management, various munitions supply functions, and bomb renovation. At its busiest point the wing reached manning levels of 1,195. The wing was organized into a Movement Control Center (MCC) and a Logistics Readiness Center (LRC). The MCC was responsible for munitions handling and transportation problems. It helped to eliminate munitions movement and delivery delays to Air Force units worldwide,

and made it possible to locate a specific munitions item in shipment and change routing, if required. The LRC effectively coordinated requests for rapid munitions support from the Pacific theater, assist with special munitions requests, and prepare up-channel reports (32:15-28).

US Army

Prior to the buildup of operations in South Vietnam, the Army's ammunition logistics system was oriented toward peacetime support. Most of the munitions requirements came from the US Army Support Command in Vietnam, the many Military Assistance Programs, and the annual training requirements of regular, reserve, and National Guard units. Most of these requirements were met by using stockpiles remaining after the Korean War. Munitions requirements which were not met using these stocks were met from a limited annual production program.

Munitions management was accomplished by the US Army Munitions Command (MUCOM). Figure 5 shows the basic Army munitions logistics organization. The MUCOM had overall mission responsibility for all facets of ammunition logistics support to Army forces and munitions acquisition for Air Force units. However, the functions of procurement, production, quality control, maintenance, and supply were performed by the US Army Ammunition Procurement and Supply Agency (APSA). The APSA was the Army's National Inventory Control Point (NICP) for munitions. Its job was to interface

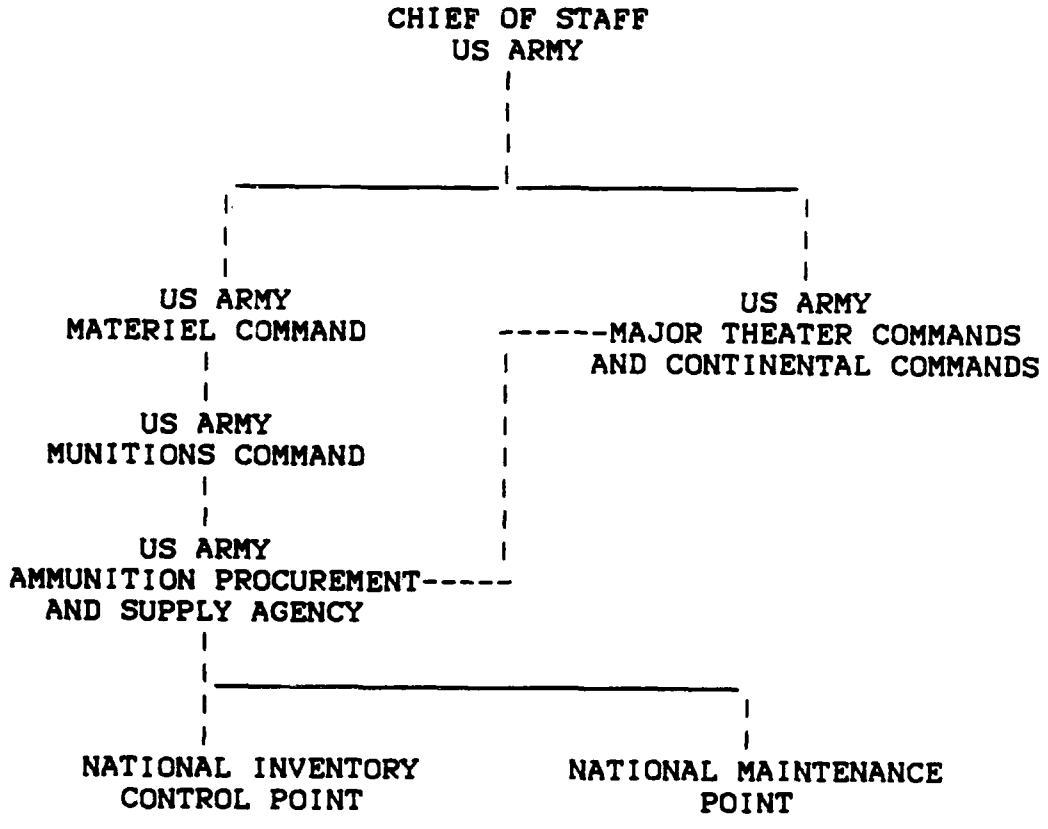


FIGURE 5: US ARMY MUNITIONS LOGISTICS COMMAND
(10:9)

directly with all Army commands, in the US and overseas, concerning munitions support matters. Specifically, its duties included reporting, requisitioning, storage, movement, distribution, maintenance, evacuation, and disposition of munitions.

Munitions management in the Pacific theater was accomplished through the US Army's theater Inventory Control Point, located in Hawaii, which was charged with centralized management of all Army theater munitions assets.

Munitions activity in the Pacific theater was relatively slow prior to the US active combat involvement in Vietnam. Activity was limited to the maintenance of prepositioned assets and the support of annual training requirements. Ammunition requisitioning was on a "pull" system in which the units would control the time and amount of munitions shipments through normal supply requisitioning rather than having the Inventory Control Point "push" it to the units without requisitions.

The APSA, under direct functional control of the MUCOM, managed the National Inventory Control Point and the National Maintenance Point for munitions. It was responsible for procurement, production, industrial mobilization planning, wholesale inventory management, supply control, and other tasks such as depot maintenance, stock control, storage, and distribution of all military munitions. The Army, through these and various other agencies, provided the bulk of munition support to the Air Force. The APSA directed

and controlled eight active and 16 inactive ammunition plants. All 24 plants were government owned, contractor operated (GOCO). As of 1 January 1965, none of the eight active plants were fully utilized. Not all available production lines were actually in operation and those that were, operated at minimum rates. In comparison to the government owned facilities, the civilian sector operated approximately 240 munitions production units, of which 51 were active at the same time as the GOCO plants.

Another important part of the US Army munitions support was the series of munitions depots. In January 1965 the US Army Supply and Maintenance Command directed the operation of 14 munitions depots. The depots were located across the continental United States and together they had a total storage capacity of 4,465,000 tons. However, they were not filled to capacity in 1965. They contained just over 3,000,000 tons. All munitions storage for the Air Force was accomplished by the Army at stateside locations. At overseas locations each service assumed that responsibility for its own munitions (11:7-14).

US Navy

The US Navy played a major role in munitions logistics support for the Air Force. Along with the Army, the Navy provided munitions storage in the CONUS and material requisitioning and production through government owned, contractor operated ammunition depots. Some munitions items

used by the Air Force were also compatible with those used by Navy aircraft. Examples would be the MK-80 series fragmentation bombs and certain ejection seat explosive components. Since the Navy was the procuring service for such components, it was responsible for consolidating all military requirements and establishing and maintaining the necessary production base. It supported the Air Force requests for the same type of components.

The majority of the Navy's munitions support was provided in the early years of the war. At Subic Bay in the Philippines, Navy and merchant marine ships hauling munitions for the war were off-loaded. Before transportion programs such as Special Express and Special Vessels were created, munitions shipments were transported to the Philippines and transferred to smaller US Navy landing craft (LST) for the final journey to Vietnam. These programs are explained in further detail in Chapter Four.

Military Sea Transportation Service

After World War II, logistics activities among the military services overlapped each other. This was not only expensive and redundant but it caused animosity and slowed progress. The concept of a "single manager" responsible for transportation functions was created to improve effectiveness and reduce inter-service squabbling. In 1956 the Navy was designated the single manager for sealift

operations in the DOD and the Military Sea Transportation Service (MSTS) was created.

In 1970 the name of the MSTS was changed to the Military Sealift Command (MSC). It remained under Navy control and was tasked to perform four functions:

1. Provide contingency sealift for military forces worldwide.
2. Develop plans for expanding its capabilities in peacetime.
3. Provide support for DOD during non-contingency periods.
4. Man and operate the Navy fleet support ships.

During times of increased readiness the MSC was to receive shipping resources from it's own fleet, the US Merchant Marine Fleet, the National Defense Reserve Fleet, and available and willing foreign flag merchant marine shipping. As will be discussed in Chapter Four, the Navy relied greatly upon the National Defense Reserve Fleet and the US Merchant Marine Fleet to provide ocean transportation to the war area (34:149).

The military services in Vietnam were dependent upon ocean shipping for logistics support from the beginning of the war to the end but the pace at which support needs changed increased dramatically within a short time. For example, during the first half of 1965, military cargo moved into Southeast Asia at a rate of 140,000 tons per month. But, by the end of 1966 that rate had climbed to 740,000 tons per month (12:9).

On 1 January 1965, the nucleus fleet of ships owned and operated by the MSTS was 89 ships. The majority of the ships

were World War II vintage, or older. Military and political leaders quickly learned ocean transportation of munitions would be critical to operational success and began to expand the military's shipping capability.

By 1967 the MSTS fleet had expanded to 119 ships with emphasis on lighterage, outsized cargo shipping, and shallow draft boats for coastal landing. The quantity of cargo ships used by MSTS, and the percentage of cargo arriving in Southeast Asia by ship continued to increase until it stood alone as the major source of military cargo transportation for all services. Munitions movement was particularly well suited to this mode of transportation because Air Force munitions were bulky and were shipped in large quantities. In 1965 the total munitions tonnage shipped from both the east and west coast areas was approximately 130,000 tons. By the end of 1968, the MSTS had shipped over 1.5 million tons of ammunition to Southeast Asia (11:124).

Soon after the MSTS became involved in shipping munitions, it was faced with a shortage of vessels to meet the military demands. It solved this problem by chartering Merchant Marine and General Agency Agreement ships from the nation's Reserve Fleet. By 1967 the average number of ships enroute, off-loading, or on-loading was over 119. This number reached to 130 by 1969, and peaked at 160 ships (11:125). Although the number of ships employed continually increased, the demands of the war were such that more ships could have been used had they been available.

Military Airlift Command

At the same time the Navy was appointed as the single manager for sealift operations, the Air Force was designated as the single manager for military airlift services. In 1956 the Military Air Transport Service (MATS) was created. It's mission was to provide common military user airlift to all DOD and other government agencies between points in the US and overseas, between and within overseas points, and within the US when necessary for security or to supplement commercial carriers.

Shortly after the creation of the MATS military leaders realized existing aircraft could not handle the frequent airlift demands of the listed responsibilities and also meet the expanding war zone demands. As an alternative to buying more military aircraft the Civil Reserve Air Fleet (CRAF) was established. This was a plan to integrate some aircraft of the civilian airliner fleet into MATS if a national emergency demanded increased airlift. In 1960 President Eisenhower approved the plan. CRAF existed throughout the Vietnam War but was never used as planned. Civilian airlines were contracted to transport cargo and personnel during the war but not as activation of the CRAF. The call-up of CRAF aircraft placed under military control was never exercised during the Vietnam War.

Even with the use of civilian airlines, the MATS did not consolidate all DOD airlift forces. The MATS did not have the ability to conduct airlift assault and air-head

operations. These were new airlift missions added to the Air Force in 1960 to provide flexible response for any crisis. By 1964 the role of the MATS was redefined to include these new missions. The ability to move troops and equipment from the US directly to the combat area was of paramount importance. Military airlift was an important weapon in the Air Force's new concept of power projection. Along with these new mission changes the MATS changed its name to the Military Airlift Command (MAC), and was given the status or a major air command in the Air Force.

The MAC was an indispensable part of the overall logistics support system in the Vietnam War. At the start of the war the C-130 was the work-horse of the command and it continued its vital role to the war's end. As the war progressed two other airframes were introduced which successfully augmented the C-130. The C-141 and the C-5, both large aircraft and heavy lifters, were the first jet military aircraft used in the airlift role.

As will be shown in Chapter Four, the MAC was responsible for flying hundreds of missions and transporting thousands of tons of munitions and munitions components to resolve inventory shortfalls across Southeast Asia. The MAC's war support was much greater than just the airlifting of munitions; but without these missions, combat operations would have suffered even more than they did because of munitions shortages. In fact, a significant portion of the Air Force's combat missions could not have been flown

successfully had the airlift munitions not arrived. The munitions airlift program can be credited with helping to resolve the critical munitions problems of the Air Force in as short a time as possible.

## IV. Munitions Logistics Chronology

Once the air war in Vietnam was underway, several munitions related problems were brought to light almost immediately. Following a brief discussion of how the US became involved in Vietnam this chapter will discuss the munitions shortfalls which affected combat operations. The material is presented in chonological sequence.

### US Involvement

As was pointed out earlier, Vietnam was divided into North and South in 1954. The Geneva Accords ended the hostilities between the Viet Minh and the French. But, the Accords also created recognition of the communist regime in the North. The United States said it would honor the agreement and would regard a violation by any other party as a serious threat to peace and security in the region. The communist leaders in the North had intentions of reunifying the country under their leadership. In the South, the US tried to prop-up the government, and promote free elections, with the ultimate objective of establishing a climate in which democratic self-rule could hold its own. Unfortunately, the political base in the South was weak and unable to establish itself as a credible deterrent to the communist insurrection.

Between 1960 and 1961 almost 3,000 South Vietnamese civilians and government officials were assassinated and 2,500 more were kidnapped. The weak Southern government

could not stop the terror and asked the US to honor it's 1954 commitment. President Kennedy responded by providing military advisors, some weapons, and increased economic aid. Kennedy reenforced America's foreign policy of containment of communism and stated how the policy must be used to avoid the "domino theory". In March 1963 he said:

> So I think we ought to judge the economic burden it places upon us as opposed to having the communists control all of Southeast Asia with the inevitable effect that this would have on the security of India and, therefore, really begin to run, perhaps, all the way to the Middle East (29:II-1-2)

By 1964 the Viet Cong stepped up attacks in the South. Internal strife resulted in two coups in the South within a three month period. These actions further undermined support for successful democratic self-rule in the South. The US continually stated that it had no intention or desire to establish territorial rule in the area; its only purpose was to support the freedom and independence of the South Vietnamese people. Up to this point, the advisors, and the military and economic aid, the US sent to the country was the only support the US felt necessary. However, in 1964 US military personnel were attacked by the North Vietnamese. This changed the President's outlook and the level of US response to situation.

Gulf of Tonkin Incident. On 2 August 1964, several US naval vessels were patrolling international waters off the coast of North Vietnam. During the night the ships reported they were attacked by North Vietnamese torpedo boats in the

Gulf of Tonkin. Two nights later, on 4 August, they again reported attacks. President Johnson reported the incident to the American people and said he was ordering US military forces in the area to take necessary actions against attackers.

The president was successful in rallying support for his actions. The American people remembered the attack on Pearl Harbor and, although an atmosphere of isolationism still prevailed, the people could sympathize with the need to stop the spread of communism. In light of this, it was easy for the President to convince the public of the need for increased military actions.

The Gulf of Tonkin incident was the forerunner for Public Law 88-408 which became known as the Gulf of Tonkin Resolution. Approved by Congress on 10 August 1964, it stated the President had the approval of Congress to take those actions he deemed necessary to repel any armed attacks against US forces and to prevent further aggression in the Southeast Asia region. It reenforced the existing foreign policy that Southeast Asia was an area of vital national interest to the US and was an important element in maintaining regional security. In essence, President Johnson received a blank check from the Congress to conduct military actions as he saw fit.

So, by August 1964, the US had been provoked into escalated military involvement. This increase was to continue through 1968 and eventually end with the downfall

of South Vietnam in 1975. Air Force leaders quickly learned the Vietnam War would not be like any war they had fought in the past; at least not from the perspective of munitions logistics support. It would not fit into the mold from which general war plans had been created and from which forces were trained and equipped. The high degree of uncertainty and the unpredictable demands would force munitions planners into inventing new means to support combat operations. This was evident as early as 1965.

## Initial Forces

The Vietnam War did not cause a large increase in US Air Force manning, but, it did cause a major reloction of forces. In January 1965, Air Force personnel in Southeast Asia numbered just over 9600. Of this number, two thirds were permanently assigned with the remaining one third temporarily assigned. By 1969 Air Force manning in Southeast Asia had jumped to over 90,000 personnel, with 95 percent permanently assigned rather than on a temporary rotational basis. Figure 6 portrays Air Force manning in the Vietnam War and how it grew over the four years between 1964 to 1968 after which it decreased until the US evacuated the area.

Manning levels of Air Force units in other areas of the world were not greatly affected by the Vietnam War. For instance, in Europe, in the same time period, Air Force manning went from 56,000 to 57,000 through 1968. There was a 4,000 man reduction after that caused by gold-flow problems

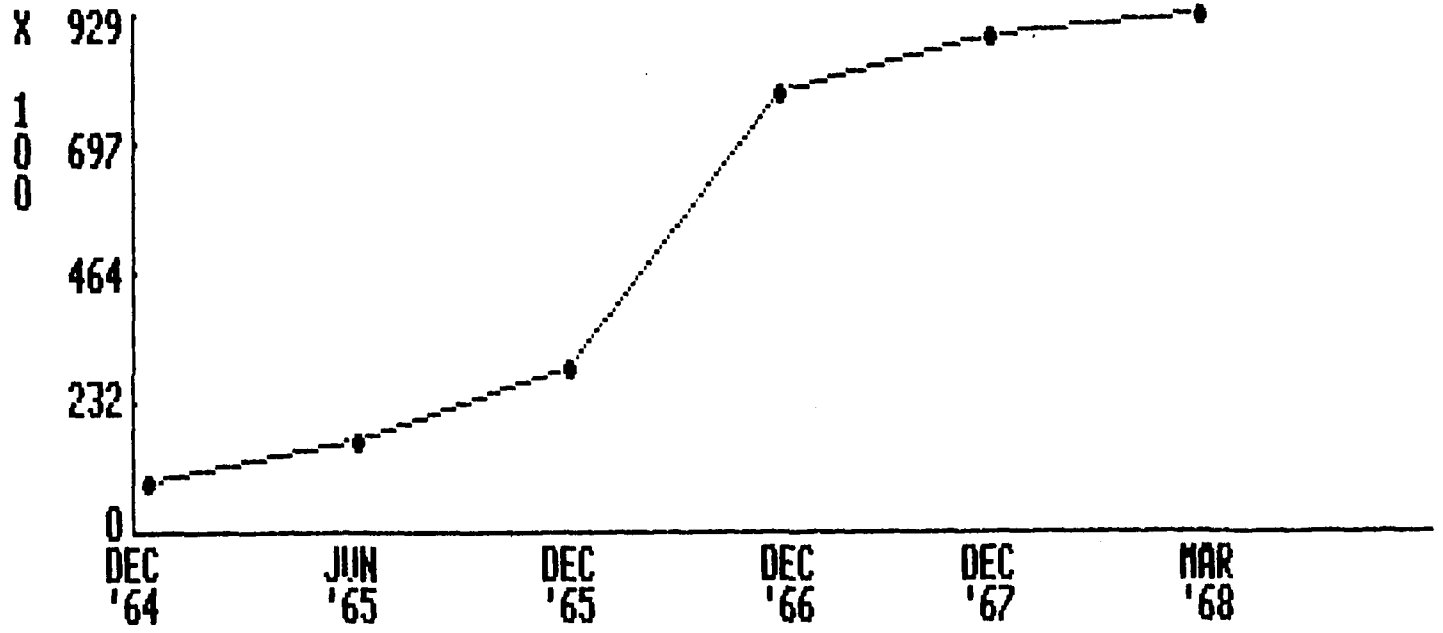


FIGURE 6: US AIR FORCE PERSONNEL STRENGTH IN SOUTHEAST ASIA (VIETNAM AND THAILAND) 1964-1968 (30)

rather than Vietnam manning. In the Strategic Air Command, manning dropped from the 1965 level of 217,000 to 126,000 in 1969. This, too, was not caused by Vietnam but, rather, by the changing US military strategy from complete emphasis on strategic nuclear forces to a combination of nuclear and conventional forces (28:I-1-9).

At the start of 1965 the Air Force had ten tactical squadrons deployed to Southeast Asia. Jet aircraft operations were not conducted at all bases because many had outmoded runways. There were three bases in South Vietnam in 1965; Tan Son Nhut, Da Nang, and Bien Hoa. All of these were capable of handling jet aircraft. However, they were very crowded, with poor facilities and little room to accomodate the US Air Force in addition to the South Vietnamese Air Force.

In Thailand there were five bases but only two of them were jet capable. All five were used by the Thai Air Force and, except for the runways and taxiways, there was little room for additional USAF forces. Takhli, Udorn, and Don Muang were the original locations for US forces in January 1965. Eventually, the Air Force deployed units to each of the locations listed on the map at Figure 7.

All arriving units deployed to interim facilities to become operational. They were located at Forward Operating Bases (FOB) and Main Operating Bases (MOB). Under the MOB/FOB concept tactical units deployed into the combat area to an FOB with their mobile equipment. The MOB performed all

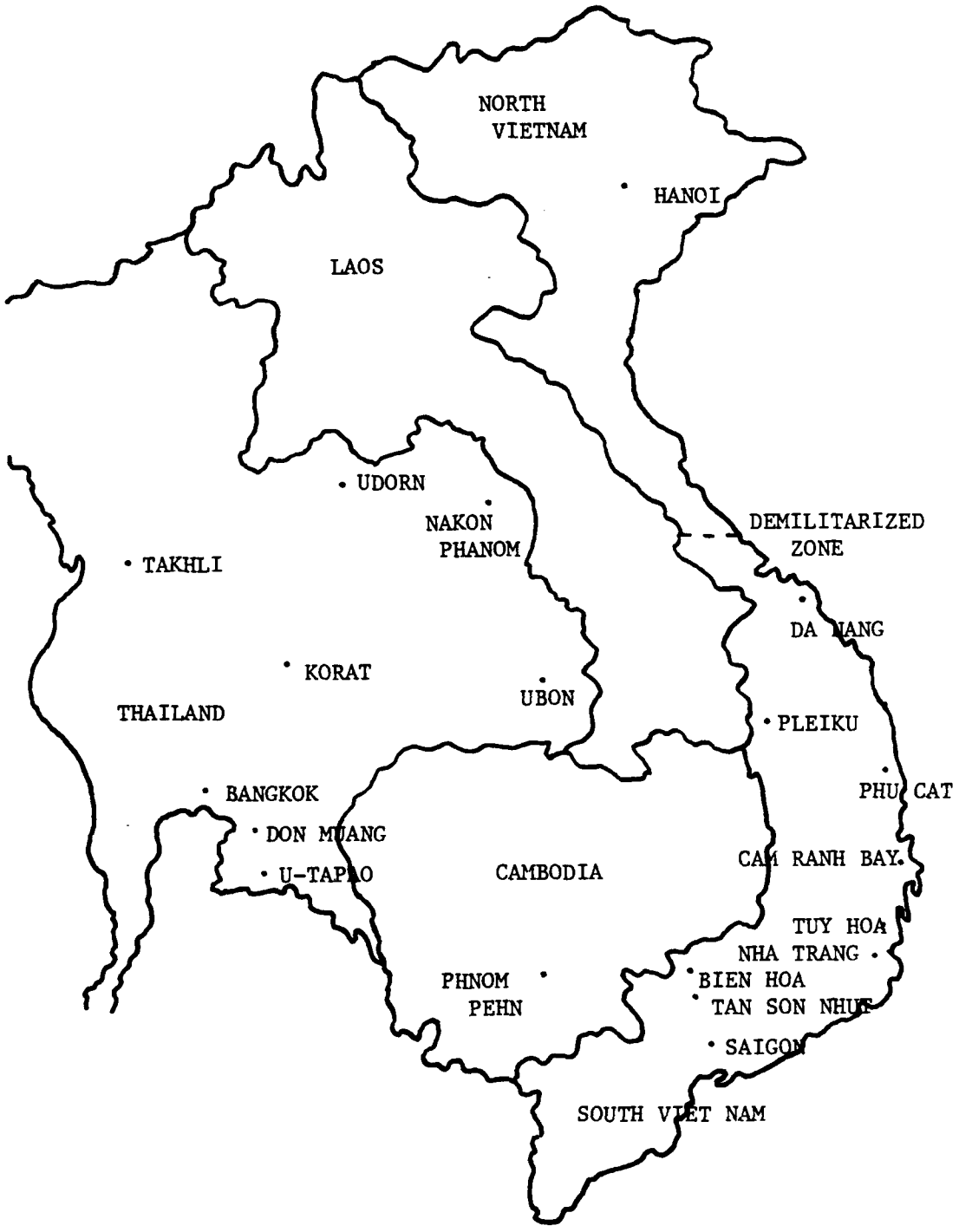


FIGURE 7: US AIR FORCE BASES IN SOUTHEAST ASIA
(33:13)

major maintenance functions which were beyond the capability of the FOB. Such maintenance actions as aircraft and engine periodic inspections, and major repairs on ground equipment were the responsibility of geographically separated MOBs (28:II-2-52). All field level repair actions were accomplished at the FOB. Intermediate and depot level repair was accomplished by the MOB. Although the MOB/FOB concept was acceptable, it was never designed to be used for an extended conflict.

Six bases were established as MOBs. These were Clark Air Base, Philippines; Kadena and Naha Air Bases, Okinawa; and Tachikawa, Yokota, and Misawa Air Bases, in Japan. Each of these were permanently established locations before the start of the war.

Three of the FOBs in South Vietnam were: Bien Hoa, Da Nang, and Tan Son Nhut. These forward operating locations were designed to support combat operations through the use of War Readiness Spares Kits (WRSK) and War Reserve Material (WRM). The WRSK were maintained and transported by the deploying unit to the FOB whereas WRM was prepositioned in the Pacific theater before combat operations began.

Condition of the Munitions Stockpile

Up to the time of increased munitions consumption in Vietnam, munitions stockpiling was very limited. Just prior to the Korean War the Air Force munitions stockpile was estimated to cost $10 million annually. After the Korean War

it increased to $2.5 billion annually. As stated in Chapter Two, the Air Force demphasized munitions stockpiling after the Korean War and declared an excess of conventional munitions. This was a result of applying the concept of fighting a war with "in-place" forces and logistics. This concept resulted in the idea of prepositioning war reserve munitions in, or close to, the expected theater of operations. Using this strategy, according to planning documents such as the Wartime Guidance, Wartime Requirements, and the War Consumables Distribution Objective, the Air Force had a surplus of munitions on hand and was ready to support all existing war plans. Therefore, military planners relied on the war plans and the stockpiles of munitions remaining from World War II and the Korean War to justify minimum budget allocations for munitions research, development, and production.

After the Gulf of Tonkin incident and the start of combat operations in 1965, analysis of munitions supplies showed that WRM stockpiles were sufficient to support the planned sortie rates. That was because sortie and expenditures rates of the past wars were still used to plan future requirements. Operations plans called for a 90 day supply on hand. (90 days multiplied by the planned expenditure rate was computed to be 29,700 tons of munitions required by operational plans). Calculations showed a balance of 39,500 tons in place in the theater. This equated to 120 days of supply based upon the predetermined sortie

rate. This figure was over three times greater than what the Secretary of Defense established in his Logistics Guidance. However, as would be seen later in 1965, the average consumption rate was not 29,700 tons but, rather, was 46,650 tons. And, by 1966 this rate ballooned to an average consumption of 91,098 tons.

Planners did not know that sortie rates would vary as drastically as they did from the start of the war to the height of combat operations. Munitions analysis was based only upon total tonnage stored in the theater, not upon the individual components or the types of munitions required for the various aircraft missions. It also did not consider the mix of propeller and jet aircraft, the latter of which could not carry or drop the older type of munitions which dominated the stockpile (31:C2-C9).

Munitions Shortages

As early as 1965 Air Force war planners saw signs of munitions shortages contrary to the figures calculated from the planned expenditure rates. The length of the war was unknown. However, the high expenditure rates could not be sustained without drastic actions. In 1965, the first full year of sustained air combat operations, the Air Force dropped more munitions than in any single year in the Korean War. A total of 148,751 tons were dropped. One reason for the large expenditures was the use of the B-52 for conventional operations. One B-52 sortie could carry up to

27 tons of munitions. This type of expenditure was not planned for in the Logistics Guidance or in theater operational plans.

Before the year ended, munitions shortages curtailed some air operations. By the middle of the year the Air Force adopted a policy of allocating certain munitions to each major command until munitions production could catch up. Worthy of note is the fact that prior to our involvement in Vietnam, as part the Military Assistance Program supporting NATO forces, the US sold many tons of bombs to our allies in Europe. However, by the end of 1965 we were forced to repurchase them for use in Vietnam. For example, shortages were so bad in 1965 the US repurchased over 18,000 bombs from Germany for our use in the Vietnam War.

Another cause of the shortfalls of 1965 could be indirectly linked to the purposeful destruction of conventional munitions stocks after the Korean War. Munitions personnel at the Air force Logisticis Command (AFLC) recall stories of being directed to destroy massive quantities of conventional munitions at the direction of the Department of Defense shortly after Robert McNamara assumed the position of Secretary of Defense. In fact, several munitions officers with Korean War experience resigned their commissions in protest to the deliberate destruction of conventional munitions stockpiles. These same people also told of munitions personnel being directed to search for abandoned munitions in the islands of the Western Pacific

where the US had stored munitions in World War II to help alleviate shortages in Vietnam (21).

By November 1965, the shortage of munitions had forced commanders in the Tactical Air Command (TAC) to reduce the allocation of live munitions within the United States. Substitute munitions such as the 25 pound practice bomb replaced the 500 pound MK-82 bomb (a condition which still exists today). Although live ordnance was still used for testing, preparatory combat duty training, and fire power demonstrations, by 1966 it had become so critical that live munitions were used only for qualification. Along with this, munitions allocations to TAC and United States Air Forces in Europe (USAFE) were redistributed just to meet minimum combat training requirements.

The munitions shortages can be explained by looking at expenditure rates. In June 1965, the Air Force flew 7000 sorties. In December that rate was over 13,000, not counting the B-52 sorties flown. Between July and December 1965, there were 1800 B-52 sorties flown which consumed 36,000 tons of munitions. The annual expenditure rate was calculated to be 480,000 tons if munitions expenditures were to continue at that rate (32:34-39). In January 1966, the total munitions tonnage available in Southeast Asia was just 18,000 tons but stockpiles were being replenished due to a bombing halt over North Vietnam. However, when bombing resumed in February stockpile quantities began to quickly

diminish. By March total stocks reached an all-time low of 13,000 tons.

The munitions shortages cited in 1965 continued into the next year, only on a larger scale. Shortages were of two types. There was a lack of the basic component such as the bomb bodies, and in other instances, there was a shortage of the components to completely build bombs. For example, a unit might have had sufficient bomb bodies to meet tasking but not enough fuzes or tail assemblies to build the bomb. This problem resulted because the bomb bodies and the components were shipped from different CONUS production facilities and were never brought together until they arrived in Southeast Asia. Until these shortages were experienced nobody considered this to be a potential problem. In some cases, the government had failed to contract for enough of the required components to match bomb bodies.

Although the shortages had been reported, the actions taken were not correcting the problem. In February 1966, the Commander In Chief, Pacific, (CINCPAC) notified the JCS of the magnitude of the problem. He drafted a message which listed, by munitions type, the 1966 munitions requirements and included a review of existing assets and their locations in country. The bottom line was a projected deficit of 563,000 bombs for the year. By April 1966, the Air Force was critically short of munitions to support combat flying. In fact, it was to the point that 367 combat sorties had been

cancelled because of munitions shortages. Shortages were a problem for all units in Southeast Asia. In the first quarter of 1966 there were 940 intratheater airlift sorties flown to redistribute munitions. This was an effort to solve the incomplete round problem. In addition to the reported cancelled sorties, an additional 515 sorties were never scheduled because of the shortages (11:51).

As early as August 1965, CINCPAC had informed the Joint Chiefs of Staff that existing stocks would not meet the next year's projected expenditures. The predictions had come true. Up to this point the problem had been pushed up the chain-of-command but no actions had been taken to solve the problem. However, when sorties were lost due to lack of munitions, and when the ground forces could not rely on close air support being there when it was needed, the military leaders back home decided action was essential.

Centralizing Munitions Controls

The first action to solve the problem was to centralize control and management of all munitions in the theater. In April 1966, the Joint Chiefs of Staff initiated this and authorized CINCPAC in Hawaii to assume control of all air munitions in the Pacific Command, regardless of service ownership. He was directed to commit them to units as he saw fit. This was a power he had all along as the commander of a unified command. Over the next several months CINCPAC directed transfers across services and Pacific locations

and, in addition, munitions transfers from the Military Assistance Program were directed when the situation was critical.

Another centralizing action occured on 15 April in the Office of the Secretary of Defense (SECDEF). The Air Munitions Office (AMO) was created to formulate and initiate an intensive management system which would control all aspects of air munitions logistics in all services, from procurement to expenditure. The SECDEF's intention was to keep the office functioning for a three month period until the crisis passed. The AMO worked directly for the Assistant Secretary of Defense for Installations and Logistics and was composed of personnel provided from each of the services. It remained in effect until August 1966 when its title was changed to the Director of Air Munitions.

Immediately upon initiation the AMO took actions to resolve shortages. The first action was to accelerate production of MK-81 and MK-82 series fragmentation bombs in the April to December 1966 period. The MK-81 was a 250 pound bomb and the MK-82 was a 500 pound bomb. The next action was to contract for production sources for the M-117, 750 pound fragmentation bomb. The AMO's objective was to gain permission for sole-source contracting, thus avoiding the delaying process of looking for competition. Although this would probably be more expensive, the time saved was more essential to the Air Force than the cost. The third action by the AMO was to seek permission from the SECDEF for

release of reserve and depot munitions stocks which had not been made available to CINCPAC up to this point. The fourth action was to release bomb components for shipment and obtain airlift from CONUS to SEA. The fifth action was to act as the focal point for munitions production by staffing information and requests from the services and the JCS with the objective of connecting it with SECDEF decisions.

All of the actions proposed by the new organization were commendable. However, the AMO was not the initiating force for any of the actions. Rather, it inherited the actions of agencies at lower echelons. For instance, with regards to expanding the production base for the MK-81 and MK-82 bombs, this was initiated by the Navy before the AMO's beginnings. The Air Force had initiated M-117 bomb production in the summer of 1965 through the Army. The Air Force also initiated an airlift transportation system for bomb components at least six weeks before to the AMO's establishment. And, finally, the bomb components which the AMO made available to CINCPAC were mostly obsolete items for which there remained little demand. In other words, the centralization of authority and the creation of an additional layer of management did not produce creativity nor did it have any more success than the system in place before the creation of the AMO (29:III-8-19 Thru III-8-23).

The AMO set into motion another set of controls which affected munitions production and eventually expenditure rates. As part of its attempt to understand and control

world-wide munitions assets, the AMO directed a world-wide inventory of 23 key air munitions items. This was an attempt by the AMO to establish a credible base-line of data from which future production actions could be based. The initial figures contained major discrepancies in service inventories. Within the Air Force errors were suspected to have been caused by late or improper reports from the Army, the agency responsible for all Air Force CONUS storage and production. The inventory revealed the Air Force did not have a system for tracking munitions in-transit from production facilities, in storage, or inventory adjustments. The results of the world-wide inventory showed as much as 25 percent fluctuation in the inventory status. The Air Force established a new inventory system which would account for all possible locations and changes.

Once the inventory adjustments were made and CINCPAC, the JCS, and the AMO could rely on the figures they had, the AMO tied the current world-wide balance to the monthly production capabilities for each type of munition. The SECDEF's intention was to tie monthly expenditures to monthly production rates. His objective was to avoid the large stockpiles of conventional munitions after the war, such as those remaining after World War II and the Korean War. With this system, future production was tied to past expenditures. However, this compounded the problem. Decreased expenditures caused by weather or limitations imposed by field commanders were sometimes evaluated at the

AMO as reductions in consumption resulting in eventual reductions in production rates (11:79-83).

Joint Chiefs of Staff Controls. The JCS assumed centralized control over some munitions functions. Also as part of the actions to increase munitions shipments to the Vietnam theater, the SECDEF established a "push" distribution system. Under this concept munitions were shipped to units without the normal requisition actions. This was instituted in April 1966. It was not long before it created excesses of some munitions items. CINCPAC eventually requested those items excess to requirements be removed from the "push" distribution list. This was granted by the SECDEF through the AMO. The SECDEF, in an effort to maintain control over these stocks, directed those munitions items removed from the list were to be placed in storage across the CONUS and were to be marked as "Joint Chiefs of Staff Reserve". These munitions could be released only by the JCS, with the approval of the Assistant Secretary of Defense for Installations and Logistics. This policy prevented the services from diverting munitions assets to other worldwide requirements without the approval of the Defense Department (29:III-8-22 THRU III-8-23).

CINCPAC Controls. The Commander-in-Chief, Pacific (CINCPAC) also extended controls over theater munitions. He established a maximum level of munitions stocks which could be on hand at any one time. It was equal to 90 days supply

at the allocated rate for each location. A requisitioning objective was established as the maximum quantity of munitions to be maintained on hand and in the pipeline. It was set at 135 days; a desired on hand level of 45 days stock plus 90 days shipping pipeline. This was a simple method of computing the stockpile objectives for each location but it caused problems for some munitions. The Navy experienced shortages in ship flares because demand for flares was not constant. The Air Force was able to obtain exceptions to the maximum levels and thus avoided the problems created by this system.

The objective of this policy was to control the level of stockpiles in the theater. It was successful. But it hurt the units in Vietnam. Temporary lulls in the war reduced expenditures thus resulting in automatic reductions in pipeline quantities. Surges in activity then would rapidly deplete stockpiles. This put tremendous pressure on the munitions transportation system (11:84).

The centralization of munitions decision-making was not effective. As seen, the AMO did not initiate any actions which the services had not already foreseen. Its policies and decision were made away from the field commander who was the most qualified to state objectives and future requirements. The limitations placed on the maximum amount of munitions allowed in stockpiles were unresponsive to sudden changes and could have been as disastrous as the problems which existed before the AMO and SECDEF controls.

Manpower Shortages

Although munitions shortages plagued combat efforts in Vietnam, they were not the only shortages suffered by the Air Force. Personnel were also in short supply in the first several years of the war.

The munitions career field was organized into different sub-functions which included munitions storage and assembly, munitions supply, and aircraft weapons loading. When combat operations increased in 1965, the Air Force discovered it did not have enough trained and experienced technicians to adequately fill these various munitions jobs. This degraded the overall in-country munitions support. It was not that munitions leaders did not plan for their requirements, rather, as with the munitions shortages, they used the wrong yardstick to measure their needs.

In 1965 the criteria used to calculate munitions manning requirements were based on total WRM munitions tonnage stored at each location. This was a static figure during peacetime because the WRM stock usually did not increase or decrease enough to cause manning to change. However, in Vietnam, daily combat support did not occur in a static environment. Thousands of tons of munitions were received, stored, inspected, assembled, transported, and expended each month, seven days a week, 24 hours every day. In the munitions storage area, munitions managers found that when they were required to support high sortie rates for extended periods, handling equipment required considerable

operator maintenance, adverse weather conditions took a toll on equipment, and the large quantity of shipping crates and packing material, generated in the Munitions Storage Area (MSA) was a problem of no small consequence. It was only a matter of hours before the bomb assembly areas became saturated with waste which slowed assembly and transportation operations.

For aircraft weapons loading personnel, or bomb loaders as they were called, it was a constant battle to keep enough personnel trained to meet each day's requirements. Aircraft loading was done by four man crews. Each member of the crew was trained and certified in a particular crew position and each had a unique job which only he could do during the loading operation. It was a manpower intensive and very specific operation. The crew was required to train and certify quarterly on each aircraft and munitions type their base supported. One of the requirements was that training must be done using inert training munitions. Initially these munitions were located at Clark Air Base, not at the bases in Southeast Asia. New crews, and crews requiring quarterly training, had to go to Clark to requalify. Also, in the early years of the war, most munitions personnel were assigned to Southeast Asia temporarily rather than for the normal one year tour. Load crews and individual crew members were constantly rotating into and out of the base adding to instability and making scheduling more complex than it need be.

In his end-of-tour report, General Gilbert Meyers, the Director of Operations at the 2nd Air Division, emphasized the requirement to adequately man all munitions operations in combat. Of the manning problems which arose in the first years of the war he said:

> Problems stem from a shortage of trained personnel and support equipment to handle the large tonnage associated with the activity. Unit manning documents of fighter squadrons were woefully inadequate in authorizing the number of personnel required for storage, handling, loading, and supplying our munitions activities. Temporary duty personnel arrived with only minimum training to meet initial shortages. Unfortunately, about the time they really became knowledgeable and productive, their TDY (temporary duty) period expired and they were replaced with other TDY personnel. An important lesson to be learned again is that munitions personnel are a "must" and have to be retained in our fighter forces during peacetime periods if we want to have the capability to fight the forces on an immediate basis (29:III-8-92).

Compounding this problem, the munitions career field was very small before the war. In fact, in the period between 1958 to 1962 the Air Force dispersed skilled and experienced ordnance personnel into other fields. It did not see the need to maintain a body of trained personnel to carry on the Air Force ordnance development function (29:III-8-2). One reason for the limited manning prior to the war was that the Army performed all munitions storage and shipping functions for the Air Force in the continental United States (CONUS). However, in Vietnam these functions were performed by Air Force munitions personnel. As a result, it was a new experience for munitions technicians once they arrived in Vietnam.

Since there was no need for these skills before the war, the training programs for officer and enlisted personnel needed drastic and immediate renovation. In fact, prior to the war's beginning, there was no munitions officer career for conventional munitions. The small cadre of officers who worked in munitions were trained in and assigned to nuclear weapons. But, they became an important part of the munitions career field in Vietnam.

The officer and enlisted munitions technical training schools at Lowry AFB, Colorado, were changed to include a crash course for officers covering munitions storage, assembly, transportation, and safety, plus weapons loading. For the enlisted personnel, the weapons loading and munitions storage and assembly operations training sessions were improved.

By 1967 the units in Vietnam received munitions people who were not only better trained but there were more of them overall. Also, by this time, unit manning authorizations were adjusted to reflect the more realistic numbers of munitions technicians required to support combat operations at each base. Also, the practice of assigning personnel to Vietnam on a temporary basis was replaced with twelve month tours. Although, this too, was an inefficient use of personnel, it was better than the quarterly rotations for combat units, in-country quarterly training was easier, there was more crew integrity, and the personnel were

available to the unit for twice as much time as before when they were constantly rotated into and out of country.

Munitions Reporting

The concentration of munitions decision-making authority caused changes in the number and type of air munitions reports which had to be generated. The need was to keep the JCS, the Air Munitions Office, and the Secretary of Defense informed. The concentration of management authority in higher echelons created unprecedented demands on combat units for logistics data which was timely, accurate, and reduced to forms which could be understood by all personnel involved. This was a difficult task because of multi-service involvement and the myriad of reports. Data had to be collected from all sources and put into one form from which top-level management decisions could be made. This type of reporting system was not available in early 1965 when control of munitions moved upward. Each service used its own reporting system and reported on different items. Further, the reporting systems were peacetime reporting systems. They were not designed for war-time use with such high expenditures rates and frequently changing inventory status. They could not handle the massive amount of information, nor could they provide the timeliness, required by the upper level agencies. The scope and depth of the information required from all the services could not be provided by any of the services. As a result, each service was required to

transform its system into one format which was compatible with the others and from which the decision makers could manage the munitions system. Since the AMC, the JCS, and the SECDEF relied on the the information provided by the services, their span of control and the reliability of the information they used to manage munitions assets was less than satisfactory.

For the Air Force, the system in being in 1965 was called the HAF S-18 report, or the DO23A Ammunition Asset Reporting Subsystem. This author found conflicting readings concerning the effectiveness of the DO23A report.

In a November 1965 briefing prepared by Ogden AMA, the DO23A was classified as a system which processed 2002 conventional munitions items and was responsive in tracking munitions inventories from the time they were placed on contract until they were consumed. Figure 8 shows the flow depicted by the Ogden briefing. The information provided by the briefing stated that the DO23A system was capable of tracking munitions inventories in all stages of development, in all locations, including in-transit, for the Vietnam War (22:1-4).

This was contradicted by other sources the author found. For instance the Joint Logistics Review Board, in its Monograph #2, Ammunition, cited the following deficiencies in the DO23A system:

> This system was quick to show itself inadequate for wartime operations. It did not provide for inputs from production, and in-transit quantities were computed

GOVERNMENT PLACES MUNITIONS ORDER WITH CONTRACTOR

----------> DUE IN FROM PROCUREMENT

MUNITIONS SHIPPED BY CONTRACTOR TO GOVERNMENT

----------> IN-TRANSIT SERVICEABLE/UNSERVICEABLE

MUNITIONS RECEIVED IN CONUS ARMY DEPOT

----------> ON HAND SERVICEABLE/UNSERVICEABLE

MUNITIONS SHIPPED TO PACIFIC THEATER AIR FORCE UNITS

----------> IN-TRANSIT SERVICEABLE/UNSERVICEABLE

MUNITIONS RECEIVED BY PACIFIC THEATER AIR FORCE UNITS

----------> ON HAND SERVICEABLE/UNSERVICEABLE

MUNITIONS CONSUMED IN SOUTHEAST ASIA

FIGURE 8: INVENTORIES WHICH THE DO23A MUNITIONS ASSET REPORTING SUB-SYSTEM CLAIMED TO COVER (21:4-5)

> positions that could not be audited. Errors introduced into the system were difficult, if not impossible, to purge from the records. Also, Southeast Asian bases were not included in the system, as munitions were dropped from the inventory when they were shipped forward from the MOB at Clark AB (11:87-88).

It was not this author's intention to prove or disprove the claims of either source. Rather, let the reader understand that the DO23A system was replaced soon after the new reporting requirements were levied upon the services following the centralization of munitions management authority.

The new report was titled "Emergency Action Reporting for Logistics Action Programming" (EARFLAP). A unique Air Force report, it was originally used for weekly reporting on only a few critical items in the munitions stockpile. However, it was quickly expanded to a daily report for all munitions items in the theater. Each base in South Vietnam, Thailand, Japan, Okinawa, Korea, and Guam provided telephone update to Seventh Air Force in Saigon each day prior to midnight. Balances, receipts, expenditures, and losses would be reported using a classified coding system. For example, a letter, or series of letters and numbers, would be used to identify each major munitions item from that particular base. All munitions were reported as complete rounds, rather than as individual components. Each base would also have a numeric code. The combination of the base name and it's code, and the munitions codes and their nomenclature, were classified. All transmissions by telephone or message were

conducted using the base and munitions codes. When Seventh Air Force had collated all the data it would be sent by immediate precedence message to Headquarters Pacific Air Command (HQ PACAF), which would continue the reporting through the chain of command until it was received by the Air Munitions Office (11:87-88). This report remained in effect until June 1969. In this author's experience as a munitions inspector on the Headquarters Pacific Air Command Inspector General team from August 1985 until April 1987, the EARFLAP report remained in effect for operational readiness inspections through April 1987.

EARFLAP reporting was an improvement over the old system but only for reporting from the base level through the HQ PACAF munitions staff level. Once the information was passed on to Ogden AMA, AFLC, the Air Staff at the Pentagon, the JCS, and other DOD agencies, it became incompatible because agencies above the base level performed different functions than did units in combat locations.

At one time, each of the agencies above the base level imposed separate munitions reporting requirements upon the organization directly below it in the chain of command. It became so confusing that, there were fourteen separate munitions reports at one point. The cause of the problem was the lack of commonality between agencies and their requirements. Each report contained different data elements, different cut-off times, and inconsistent definitions. It was impossible for munitions controllers at Seventh Air

Force to respond to each report's format quickly and correctly. Agencies tried to reconcile balances between the conflicting formats. When disparities were found between the different reports they were understood to be errors rather than report format problems. Reporting was often delayed and a new report would be requested to correct the problem. For example, the M117 750 pound bomb and the MK-80 series bombs could use the same fuzing. Because units reported complete rounds, the unit did not know which bomb to report the fuzes against. In the case of the M-117 bomb, it required 13 components to build a complete round. Since there were a variety of fuzes, tail assemblies, and fuzing delay elements which could be used, it was possible to have over 5000 different combinations of complete rounds. A unit could not report to this level of detail, nor would it have been useful to higher commands. But these were some of the problems inherent in the EARFLAP system.

In 1969 the Air Force initiated a new computerized reporting system which was eventually installed across all Pacific Theater bases. The Base and Command Standard Reporting System (D078) was the final improvement required to make Air Force munitions reporting standard for all agencies across the chain-of-command. It made the greatest possible use of modern data communications and processing equipment available at that time.

Using the D078 system, each base prepared punched cards for all daily munitions transactions. As with the other

systems, Seventh Air Force collected the data from all Southeast Asian bases. After editing, the information was transmitted in computer language by telephone to HQ PACAF. At PACAF the inputs from the remaining Pacific theater bases were collected and sent up the chain-of-command. The Director of Munitions at Seventh Air Force's ammunition control point had the following to say concerning the new reporting system:

> Daily reporting was easier because the new system eliminated large volumes of priority message traffic. It created a quality control capability that did not exist prior to 1969. And it reduced the number of man hours required to process the daily reports (3:I-6 thru I-8).

Had it not been for the uncertainty as to the length of the war, the unforeseen munitions expenditure rates, the lack of adequate munitions stocks at the time the Air Force began operations, and the centralization of decision-making authority, munitions reporting procedures would not have been as large a problem as they were. The initiatives taken to create a munitions reporting format which met the needs of every organization up the chain-of-command were commendable. However, the problem, which was caused by the centralization of munitions controls, was made much greater than it should have been. Munitions planners could not have foreseen the requirements which would be levied upon them from these organizations. But a standardized munitions reporting system, at least within the structure of the Air Force chain-of-command, should have been established in

peacetime, and should have been easily adaptable to combat with little variation. This was not done. Munitions accountability is paramount in war-time, but it is just as important in peace, not only for planning purposes, but for security reasons. The requirement was always there but the improved report was not created until the situation reached crisis levels. Had muntitions logisticians looked into the future they could have anticipated this and created a system which, as a minimum, met the needs of Air Force organizations. Had such a system been in place and in use it may have been easier to "sell" it to the higher level people who were looking for answers. As it turned out, Air Force logisticians were forced to respond to the needs of those in the Department of Defense. The resulting report turned out to be very tedious and time consuming, and it required much duplication of effort.

Transportation Initiatives

Supporting combat aircraft at a number of different locations in South Vietnam and Thailand, with the many types of munitions required, was an immense task. Early in the war munitions expenditures exceeded on-hand supplies and reduced the number of combat sorties flown against enemy targets. In the early days of the war, before USAF tactical units began deploying to SEA in large numbers, the munitions stockpile was sufficient to support sortie requirements. Munitions storage facilities, although small and archaic, were

adequate to meet the then present demands. But, once the build-up of forces in SEA began, USAF munitions planners knew drastic changes would have to be made or combat operations would not be able to proceed with the required numbers of sorties. To understand the evolution of the Southeast Asian munitions transportation system, it is necessary to understand the munitions requirements and the transportation system used prior to the 1965 buildup.

Pre-1965 Transportation and Munitions Storage System. In 1964 the US Air Force had three squadrons of propeller driven A-1E Skyraider aircraft and only a few B-57 bombers deployed in Vietnam. Neither aircraft had a large munitions load capacity. Munitions support was relatively easy for this quantity of aircraft with their relatively light munitions loads and low sortie rates. The existing transportation and storage system could easily handle the workloads levied by the operational needs of these squadrons. However, as the Air Force deployed more units with modern jet aircraft, and larger munitions capacities per sortie, logistics planners could foresee massive problems in munitions storage and transportation.

As early as October 1964, PACAF munitions planners calculated that 7,563 tons of munitions would have to be moved into SEA bases each month to support the planned force deployments. This far exceeded the capacity of the existing bases to store munitions. It also exceeded the capacity of

the transportation system to ship these quantities of munitions.

At that time munitions were shipped from various ports in the United States to Subic Bay in the Philippine Islands. From there the munitions were transported either to South Vietnam, or to Clark Air Base in the Philippines, for theater storage until called forward for use. However, the system was more complex than this simple explanation. After the ships arrived at Subic Bay, the munitions for Vietnam were offloaded to LSTs (Landing Ship, Tank) which would transport the shipments from Subic Bay to Saigon. On arrival in Vietnam the munitions would be off-loaded from the LST and on-loaded to barges which would be towed to one of several up-river landing sites. Needless to say, this system was very slow. It required many ships, LSTs, barges, tugs, and qualified maritime and munitions stevedore personnel. Another disadvantage was that barges were vulnerable to Viet Cong attacks from the shores as they moved up river to their off-loading sites. A great part of the river was controlled by the Viet Cong who made the slow moving, and highly explosive, barges a prime target for ambush.

At this time the USAF bases in Vietnam were maintaining a 30 day supply of munitions. The MOB at Clark Air Base had a munitions stockpile of 120 days in storage for resupply of the FOBs in Vietnam and Thailand. The average time to resupply Clark Air Base from the United States was 90 days.

The time required to transport munitions from Subic Bay to South Vietnam was anywhere from 24 to 35 days (5:39).

It was possible to have up to nine months of munitions in the resupply system at one time. The munitions shipping time table was as follows:

| | |
|---|---|
| Order and shipment of munitions from production plants to CONUS ports: | 30 days |
| CONUS port holding time, loading, and ship tranportation time: | 45 days |
| Off-loading munitions ships at Subic Bay and tranporting to Clark Air Base: | 15 days |
| Stockpiled munitions supply objective at Clark Air Base at all times: | 120 days |
| Average munitions resupply time from Clark Air Base to South Vietnam: | 30 days |
| Forward Operating Base stock level for all bases: | 30 days |

It was possible for munitions to spend 270 days in the transportation and storage system before they found their way to the flightline to be loaded on the aircraft. As stated earlier, this system was satisfactory for the level of action in late 1964, but for the activity which was to take place from 1965 to the end of the war, the system would need to be replaced (5:37-39).

Project Special Express. In the first months of 1965 munitions expenditures began their dramatic increase. Continued munitions resupply from Clark Air Base and Subic Bay would not provide the level of support US Air Force units needed. So, in late 1964, munitions managers from the

Air Staff, HQ PACAF, and AFLC proposed a radical change to the system. It was called Project Special Express and was developed to remove munitions operations support for Vietnam away from Clark Air Base and Subic Bay, and to increase the volume of direct munitions shipments to SEA. The idea was to assign dedicated US merchant ships to transport munitions from US ports directly to South Vietnam without the time consuming stops at Subic Bay and Clark Air Base. On arrival in Vietnam the ships remained off-shore at various locations as floating munitions storage depots until their stocks were depleted. All munitions support operations conducted in the Philippines would be terminated except for direct support of 13th Air Force operations.

The advantages to be achieved were:

1. More secure storage in Vietnam because the large ships would anchor off shore and away from the Viet Cong or North Vietnamese threat which existed in the rivers and on land.

2. Lower transportation costs because fewer maritime and storage resources were used.

3. Better item location and stock control because munitions warehousing and record keeping on board the ships were similar to proven land storage systems.

5. Reduction of pipeline shipping time from 270 days to 165 days for Vietnam munitions by eliminating stops in the Philippine Islands (5:39).

In January 1965, Special Express was approved by Headquarters US Air Force. The first action to take place was the leasing of five vessels from the Military Sea Transportation Service (MSTS). They were to be used exclusively by the Air Force for munitions shipments. The

first ship arrived in South Vietnam in May 1965. With the rapid expansion of US forces across South Vietnam and into Thailand, the munitions authorizations increased incrementally. Special Express developed at a time when munitions support was at its highest. The original five vessels proved successful but if the expansion of USAF operations were to continue, the five ships would have to be augmented with additional ships.

An additional five ships were added in June, and by October the project had developed well. The ten Special Express ships were supplying 15,000 tons of munitions per month to Vietnam. Although this was a vast improvement in munitions logistics, munitions expenditures were forced even higher due to increased sortie rates. More additions to the system were needed. Projected munitions expenditures for combat operations were 30,000 tons per month for the coming year. By the end of 1965 Special Express had grown to 12 ships. Together they provided the capability for storing 90 days supply of munitions for the theater, both on-site and off-shore in Vietnam.

In April 1966, as part of the centralization of munitions management authority, the JCS began "pushing" munitions to Southeast Asia regardless of individual unit's needs. This further increased the total munitions requirement across the theater and it required additional Special Express ships. This brought the total to 37 ships in the system. With the increase in the number of ships, the

AFLC created several new organizations to help manage the system.

The Shipment Control Office, located at Ogden AMA, was initiated in January 1966 to monitor munitions assets from the time they were accepted from the production facility until they were shipped from US ports to Southeast Asia. This office maintained telephone and message communications with the following agencies: Army ammunition control points, CONUS munitions storage sites, munitions production facilities, land carriers, port services, the Military Traffic Management and Terminal Service, the Military Airlift Command, the Military Sea Transportation Service, and the munitions staff at HQ PACAF.

The second organization, the Concord Port Detachment, was located at the Concord Naval Weapons Station in California. It was created by AFLC to help manage the large volume of munitions being routed through that facility. Since munitions assets were sent to the port directly from the production facility, AFLC needed the office to establish a liaison between MSTS and AFLC munitions managers. With its representatives at the port AFLC could more easily establish the munitions shipping priorities and ensure that the ships were loaded in the order which promoted easiest unloading in Vietnam. The AFLC representatives also helped ensure that only complete rounds were shipped. For example, the Shipment Control Office and the Concord Port Detachment provided the interface between civilian production facilities, CONUS

transportation systems, and the port services. The new office gave munitions managers at AFLC on-scene assessment and increased management control over all munitions assets in the shipping pipeline through their final destination in Vietnam.

Project Special Vessels. As with the Special Express program, Project Special Vessels was used to supply munitions to tactical air forces. The idea of using ships for munitions transport, floating storage, and selective unloading in Southeast Asia worked very well. However, Special Express was used to "push" munitions to the theater. Using the ships as floating warehouses provided flexibility and safety for the munitions, but it was costly and tied up the ships until their stocks were completely unloaded. This approach, although effective, was inefficient and resulted in theater port congestion and loss of munitions accountability in the early months of its inception.

In October 1966, a Special Express conference was held at Ogden AMA in which munitions managers from HQ PACAF, AFLC, and other DOD agencies proposed changes to the munitions transportation system. The idea was proposed to orient the shipping system to the "laws of demand" rather than to the "push" supply system then in effect. Munitions planners felt the change was needed but it would only work if shipping vessels from the MSTS were available for use on an "as-required" basis.

Prior to this time, there was a maximum of 56 vessels used for Special Express and each was dedicated to the system (32:115). The quantity of munitions shipped to the theater continued to increase. But, as the number and condition of port facilities in Vietnam improved, the emphasis shifted away from floating warehouses to immediate off-loading at the port.

Because of this munitions planners looked to change the method of contracting for the ships. The MSTS said it could guarantee vessels for the program only if it received 21 day prior notice of the requirement. The conferees agreed that a 21 day notice of vessel availability was ample time for planning requirements. As a result, the new plan was approved and the name of Special Express was changed to Special Vessels.

The major difference between the two programs was in the number of vessels available for use and the contractual arrangements for the ships. With the new procedures, all vessels in the MSTS fleet, if available, were considered for use as opposed to limiting the ship selection to the list of dedicated bottoms. In Project Special Express, each ship was under contract for Air Force use only, was paid on a per diem basis, and remained in the Southeast Asian theater until all cargo was depleted. However, under Special Vessels, the ships were contracted for a one way trip. Any ship available was assigned to the Air Force for use, as before, but now the munitions were off-loaded in Southeast

Asia almost immediately upon arrival. The concept of a floating warehouse was dissolved. With the new project, 70 percent of the ships made one port call for unloading while 30 percent had a maximum of two port calls from which they could be off-loaded. Once unloaded, the contract was terminated and the ships were free to contract to move other cargo (1:5).

Projects Special Express and Special Vessels served an important purpose for the tactical air forces in Vietnam and Thailand in 1966 through mid-1968. It was the ingenuity of munitions managers which created these systems to support the needs of Air Force units at a time when munitions requirements drastically increased. Few people would argue with the idea that it was a costly method of logistics support. But, considering the rapid escalation of the war, the distances involved, the massive quantities of munitions needed, and the fact munitions storage was in it's infancy in the Air Force, these projects were the life-blood of Air Force combat opertions. Without them the war effort could not have continued without drastic sortie reductions (5:35-71).

Project Sun Bath. The two programs mentioned above were successful in supporting tactical air missions, but they were not used to support the strategic bombing forces. Another program was created to support them. It was called Project Sun Bath. It should be noted the author found little

source material on Sun Bath and the material found focused on the debate of which port Sun Bath ships would be loaded from. The material available to the author is presented below.

There were two Strategic Air Command units supporting the war with B-52 aircraft. One unit was at U-Tapao Royal Thai Air Base, deep within the country of Thailand and away from ocean ports. The other was at Anderson Air Force Base, Guam. The sources this author found said that floating storage and multiple point off-loading was not compatible for either of these SAC units. However, this seems contradictory in the case of Anderson AFB, where port facilities were available.

The Air Force initially moved all munitions for B-52 operations through the Naval Ammunition Depot at Bangor, Washington. Because of the high volume of munitions moved through Concord Naval Weapons Station in California, the primary port facility for Special Express and Special Vessels, Sun Bath munitions were loaded at Bangor. Concord facilities could not handle the increased number of ships or munitions which would have accompanied simultaneous operations. Also, the movement pattern from Concord was well established; any changes or additions of the magnitude required would be disruptive to the tactical units. And, finally, the number of different types of munitions required for the B-52 was not as large as for the various tactical

aircraft. The Bangor facility could easily support the limited types.

Between July 1965 and January 1967 there were 28 ship loads of SAC munitions moved out of the Bangor facility. By mid-January 1967 the AFLC proposed using an east coast port. This proposal was made because the AFLC calculated that CONUS transporation savings could be realized by allowing munitions to be shipped from the east coast.

As part of the centralization of munitions management authority, the JCS placed very tight time restrictions upon AFLC and the production facilities for getting newly assembled munitions to Southeast Asia. They allowed only 60 days to complete the production process and get the munitions shipped to Vietnam. This time schedule was very restrictive. Listed below are the maximum number of days each of the major operations could take:

| | |
|---|---|
| Loading the new munitions onto trucks at the production facility: | 1 day |
| Transporting munitions from the production facility to port: | 7 days |
| Assembling the shipping lots and warehousing them in the hull: | 3 days |
| Loading the munitions into the ship: | 8 days |
| Sailing time from CONUS to Vietnam: | 22 days |
| Servicing the ship: | 1 day |
| Unloading munitions in SEA: | 18 days. |

Under these constraints transportation and port operations were expensive due to increased personnel

requirements. Also, the only way the munitions could arrive in time was by shipping them from west coast port facilities. In October and November 1966, munitions managers at AFLC recommended cancellation of the JCS restrictions on the 22 day shipping time. AFLC personnel said it would give them increased flexibility in managing SAC-designated munitions shipments. On 16 November 1966, the JCS lifted some restrictions and subsequently all restrictions on mandatory delivery times were lifted.

After this, AFLC munitions managers further studied ways to cut costs by shipping from the east coast. Their studies looked at pipeline times, material routing, and transportation costs, and found that since the majority of production facilities were located closer to the east coast, surface transportation costs could be reduced, and work loads at the already congested west coast ports could be decreased. Although the shipping time would be extended and would require an increase in the amount of munitions in the pipeline, the maximum extension would be 17 days. The increase in production to cover that extra requirement would be minimal as would be the impact upon SAC forces. Starting in December 1967, 43 ships departed Sunny Point, North Carolina, for Southeast Asia. Estimated savings per ship was $296,631. The net savings for the overall progam was $12,755,137 (5:74-79).

Southeast Asia Airlift. The three sealift programs were effective. They moved the bigger, bulkier items, and the mass of munitions. However, there was another problem which caused shortfalls for deployed USAF units. As mentioned earlier, the munitions shortages which started in 1965 were not only caused by lack of basic components but shortages were also due to the lack of sub-components for building complete rounds. The Air Force employed a number of types of fragmentation bombs, missiles, cluster bombs, and fire bombs in the Vietnam War. Each individual bomb was made up of sub-components such as arming wire, nose and tail fuzes, tail fins, fuze well adapters, and booster adapters, just to name a few. Up to the time of the USAF combat involvement in Vietnam, the munitions managers did not pay much attention to how these sub-components were shipped. The policy was to ship the sub-components separately from the major munitions components. The parts could all be brought together after receipt at a base. However, with the stress of war, and hasty shipments, Air Force units began to experience the problems of incomplete rounds. All the necessary components needed to build the weapon for combat use were not available at the same time. For example, in March 1966, Seventh Air Force reported that 53% of its total munitions assets in storage were incomplete rounds and not available for combat use. Hundreds of tons of bombs were not usable because they had no fuzes or tail fins (26:I-1-218).

This is where the Southeast Asian Airlift (SEAIR) program came into being.

In March 1966, Project Special Express was augmented by direct munitions flights from Ogden AMA at Hill Air Force Base, Utah. The program was entitled SEAIR and involved the airlift of munitions using military aircraft. In it's first 16 months of operation it transported 20 million pounds of critical munitions sub-components to Southeast Asia. An example of some of the items shipped by SEAIR included rocket motors: white phosphorus rocket warheads; CBU-24s; MK-24 illumination flares; M904, M905, and M907 nose and tail fuzes for bombs; and nose and tail adapter booster used to mate fuzes to the bomb bodies. Figures 9 and 10 show the tons of munitions shipped and the number of airlift missions respectively (5:62-64)

As with the other projects, critically short components were shipped directly from the contractor's facilities in the United States to either Ogden AMA or Travis AFB. From these locations daily C-124, C-130, and C-141 airlift missions would depart to Southeast Asia with shipments of critically short munitions components. The flights were organized according to the highest priority of munition sub-components needed in the Vietnam theater (29:III-8-56 Thru III-8-60).

Initially the flying schedule called for three aircraft to depart from Ogden AMA and four to depart from Travis AFB on alternate days of the week. At the request of Ogden AMA

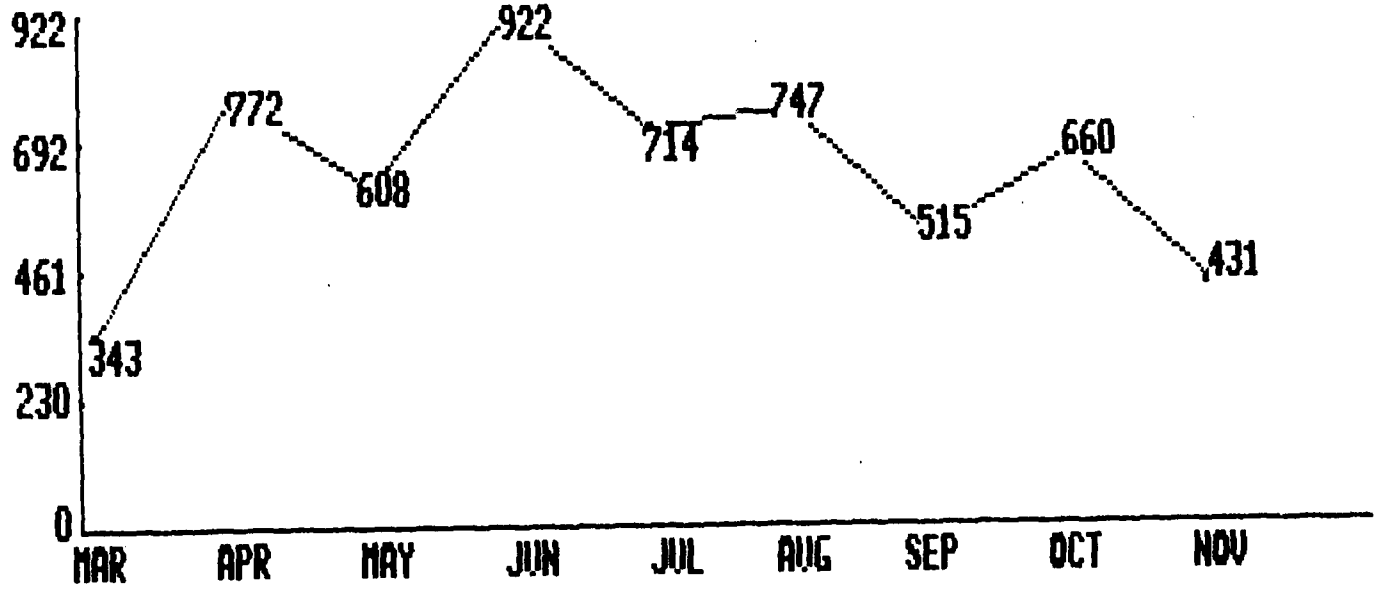


FIGURE 9: SEAIR TONS OF MUNITIONS SHIPPED TO SOUTHEAST ASIA IN CALANDAR YEAR 1967 (5:63-64)

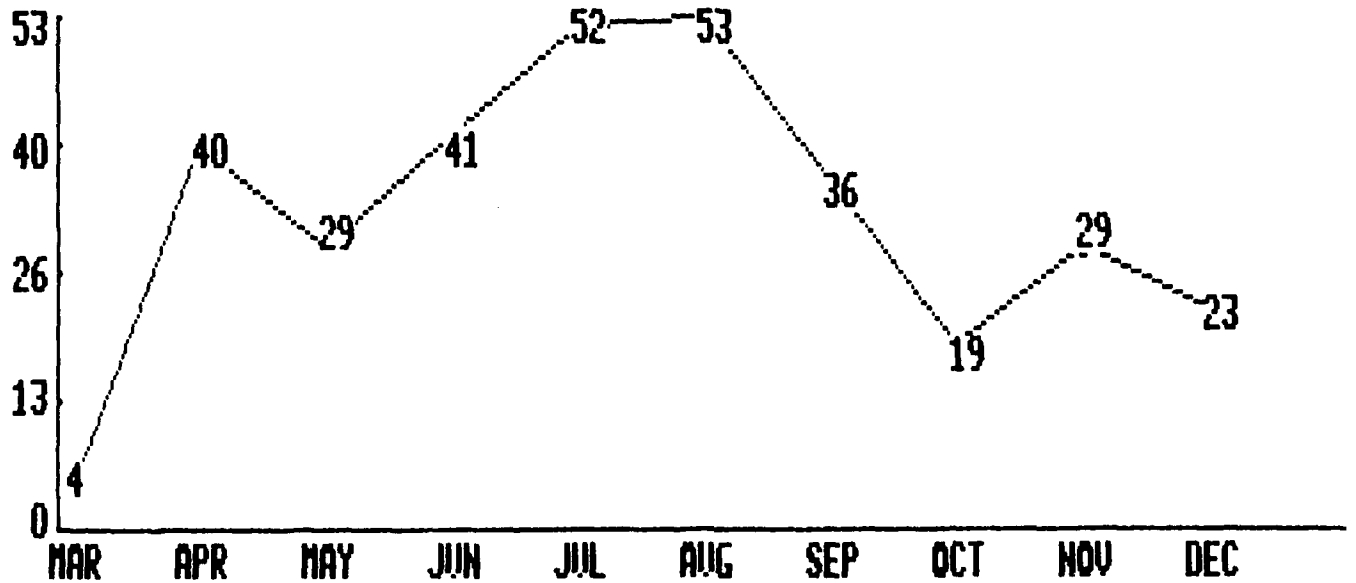


FIGURE 10: SEAIR MISSIONS TO SOUTHEAST ASIA IN CALANDAR YEAR 1967

(5:63-64)

munitions managers, this schedule was changed so that all flights originated out of Hill AFB. This was because Travis AFB, a Military Airlift Base, was overburdened with airlift requirements for other needed military supplies and passengers. The flightline and cargo processing areas were too crowded to allow expedient and safe munitions movement. Another advantage of moving all cargo from Ogden AMA was that a single point of assembly and processing allowed greater control of munitions and it increased the speed of delivery to areas with the greatest needs.

SEAIR operated from March 1966 to October 1968. The program provided the needed subcomponents to deployed units in a timely manner. Although the program was initiated to serve the needs of combat units in Southeast Asia, it was also used for a very short period in supplying munitions to USAF bases in South Korea when the USS Pueblo, a Navy intelligence ship, was captured by North Koreans.

Project SEAIR proved itself as successful as the other munitions transportation programs. Munitions components were moved into the theater in a relatively short time making it much more responsive to the unit's needs. The average shipping time by SEAIR was 41 hours. Compared to the 20 to 25 days it took to sail, the advantage was obvious. However, the costs were staggering when compared to ocean transportation. For ocean shipping it was estimated the average cost per ton was $138.52, including port handling and in-country transportation. For SEAIR, the average cost

per ton was $934. At its peak, in February 1968, the monthly cost for the program was $2.8 million (32:115-119). Regardless of the costs, SEAIR met the needs of units across Southeast Asia in a timely manner. Although most people would agree there probably was a better way to solve munitions shortfall problems, hindsight and common sense would support SEAIR in the future if the Air Force is ever again in a similar situation.

## Conclusion

At the start of 1965 the USAF began it's long involvement in the Vietnam War. Personnel problems, munitions shortages, and changing levels of management controls were some of the major problems which surfaced immediately. Each of these problems affected combat operations.

Manning problems were caused by the policy of rotating personnel into and out of the theater on a temporary basis, such as quarterly and semi-annually. This adversely affected the aircraft weapons loader training program and eventually their availability to the wing. In the munitions storage area, manpower problems were created because this was the first time in Air Force history munitions assembly and transportation operations were conducted on a large scale with Air Force personnel. Before this time these functions were accomplished by the Army.

However, the biggest impact was munitions shortages. Shortages were classified as the lack of basic components and the lack of sub-components needed to build complete rounds. Prior to the start of the war all planning documents and Air Force doctrine agreed that the Air Force could support combat forces through the deployment of units to isolated location using the MOB/FOB concept. Logisticians, using these planning documents, calculated a surplus of munitions, including in theater assets at the time the war started. But all planning factors were based on past history. Soon after the war started it was obvious sortie rates would quickly exceed those planned for and munitions stocks would not be enough to sustain combat operations at such high rates.

Once the JCS and the SECDEF realized the seriousness of the shortages, they implemented actions to centralize control of all munitions assets. The articles cited in this study showed that the individual services had initiated actions to resolve the problems. The centralization of controls cannot be credited with correcting the problem. On the contrary, they should be credited with making the problem more complex than it should have been and for impeding progress.

Probably the most ingeneous program to solve the munitions shortages was the creation of the series of transportation programs to expedite munitions into the theater. Projects Special Express and Special Vessels were

truly remarkable accomplishments. The two efforts were successful because of the cooperation between the military services and between the government and the civilian maritime industry. Along with that, Project SEAIR helped to solve the problem of malpositioned munitions components.

The demands placed upon the munitions logistics system were immense. The military and civilian personnel who struggled to overcome these problems can be proud of their accomplishments under such adverse conditions and constricted time requirements. But, on the other hand, the military commander and logistician cannot afford to forget the lessons which we relearned in this, the nation's latest war. The final chapter discusses what this author believes to be those things which must, as a minimum, be remembered, if not implemented into the US Air Force's munitions operations, if the nation is to avoid making the same mistakes in the future.

# V. Conclusions and Recommendations

This chapter summarizes the munitions logistics events of the US Air Force during the Vietnam War. It recalls the investigative questions asked in Chapter One and re-states how they were answered. Then there is a summary of how munitions logistics actions have changed since the war ended and, finally, there are brief recommendations for further study.

## Answers to the Investigative Questions

This study was based upon a series of questions which, when answered, would provide insight into the manner in which munitions logistics operations supported the US Air Force in the Vietnam War. The questions and a re-statement of their answers follows.

Question One. With reference to procurement, the industrial base, and prepositioning of assets at strategic locations, what was the condition of the USAF munitions stockpile prior to the start of combat operations in 1965?

Answer. This paper went to length to describe the history of the US munitions industrial base. This was done to point out that despite the fact our military planners began to realize in World War I the importance of civilian industry to support mechanized combat, we entered each successive war unprepared to support combat operations with required levels of munitions. In every case, except for

World War I, military and political leaders could have avoided munitions shortages and the long lead times needed to develop the industrial base.

This author pointed out that after each war logisticians developed a set of "lessons learned" which, if corrected, would prevent the nation from making the same mistake in the next war. This was certainly true after World War I. Military leaders knew that changes to pre-war planning were needed to adjust for long industrial lead times. As a result, the first in a series of post-war reforms were established which were viewed by military and political leaders as the proper corrective actions to prevent the problems from recurring. But, the Industrial Mobilization Plans (IMPs) they created to prepare for the next war were never implemented because they called for nationalization of the country's private industries. This was perceived as too much military control over civilian business even in war-time. Also, after the war, the nation quickly shifted it's perspective away from military preparedness toward developing a healthy civilian economy and a return to isolationism. This resistance was enough to defeat the purpose of the IMPs, at least until after the next war.

Although the specific recommendations following World War I were not fully implemented, at least the nation understood that future wars were going to be different, that industry was important, and that munitions expenditures

would be enormously greater than they had been in the past. Military and political leaders could no longer be excused for not predicting the importance of munitions stockpiles and industrial readiness.

By the time that World War II started, munitions production capability was slowed by isolationist policies, other economic priorities, and the depression. The US was fortunate to delay its entry into the war, while at the same time building up it's industrial base by supplying military materiel to our allies. It was not until 1944 that munitions production reached it's peak, fully five years after the start of the war in Europe.

World War II logisticians once again recognized the importance of munitions stockpiles as a buffer against industrial production lead times. Also, they realized the importance of funding munitions production during peace-time to maintain a "warm" production base which could respond rapidly to military needs. The IMPs which were discarded after World War I were used to build plans for this warm production base. A three phased system was developed to classify the nation's mobilization readiness and provide the needed annual funding to maintain the munitions industry in peace-time. There were specific goals developed for munitions production facilities and the amount of time each would require to be producing at full capacity. These goals were as close as the nation would come to maintaining peace-time munitions production capable of quickly

responding to another war of the magnitude of World War II. However, as with the prior wars reform actions, the Congress failed to continue the needed appropriations and once again the munitions plants deteriorated.

During the Korean War the nation developed a plan of limited mobilization designed to run over a long period of time with the goal of increasing production without causing inflation or degrading the nation's standard of living. Munitions consumption in Korea was very high. The military quickly learned their munitions stocks were in short supply and the production base was not prepared to respond to the new, large demands. After that war reform was once again proposed. But, as time went on the services used only a fraction of the money authorized for industrial preparedness and munitions plants again suffered. Another stumbling block was the Air Force's philosophy of fighting the next war with nuclear weapons, with forces in place. Thus, the need for funding the industrial base was degraded.

When the US began supporting limited operations in Vietnam, logistics planners believed they could support combat operations with the existing stockpiled munitions. Munitions on hand were located in the United States and throughout the world at designated, predeployment locations. The quantity of war reserve munitions on hand at the start of the war actually exceeded that required in war plans. Without the knowledge that US combat forces would be entangled in the war for ten years, and because munitions

forecasts for the future were based on past expenditures, planners saw no immediate need to increase munitions production. But, they quickly learned that both of these actions would lead to shortages early in the war.

As with the Korean War, the political leaders decided to fight the Vietnam War without mobilizing the nation's industries and by trying to fund the war with a peacetime economy. By 1965 combat commanders were forced to cancel sorties and conserve munitions because of the lack of basic components and because of shortages of sub-components. In an effort to buy time, and allow munitions production to build itself up to capacity, the Air Force repurchased munitions earlier sold to foreign allies in Europe and to locate World War II munitions depots abandonded in the Pacific in hopes of finding bombs which could be used in Vietnam.

The munitions shortfalls experienced in the Vietnam War could have been avoided. Had military and political leaders fully developed and maintained the initiatives they proposed at the end of each previous conflict, conventional munitions shortages would not have affected the USAF in Vietnam.

Question Two. What civilian and military organizations were involved in supporting USAF munitions logistics operations in the Vietnam War and how effective were they?

Answer. There were a variety of military and civilian organizations which directed and supported USAF munitions operations throughout the war. The type of support and the

amount of involvement from each agency varied as the war progressed.

The Department of Defense was the primary agency which directed munitions programs. From the start of the war, primarily due to munitions shortages, the Secretary of Defense (SECDEF) was personally involved in munitions related matters. Not only was he the principle representative to the president for military actions, he also established munitions production policies and goals for the military. Thinking that the war would be of short duration, the SECDEF initially established an objective of limiting munitions production to that which would be required for the war and also for war reserve requirements after the war. This was never achieved because of the long duration of the war. The SECDEF was also involved in centralizing munitions management responsibility to higher levels within the Air Force and the Department of Defense.

Below the DOD were a series of military organizations which controlled Air Force munitions logistics. The first echelon below DOD was the Joint Chiefs of Staff. Primarily responsible for planning and policy guidance, they advised the SECDEF on many occasions and provided instruction to subordinate commanders. For example, they cleared the way for the CINCPAC, the unified commander of all US military forces in the Pacific, to assume control and authority over all theater munitions assets, regardless of service ownership, and dispense them as he saw fit.

Under the command of CINCPAC was the commander of all Air Force units in the Pacific, CINCPACAF, and also the US Military Assistance Command Vietnam (USMACV). Although the USMACV was responsible to the CINCPAC for all military actions in Southeast Asia, most requests for Air Force munitions logistics support were handled by the CINCPACAF and his munitions staff.

There was a great deal of support provided to the Air Force by the US Army and US Navy. The Army's principle objective was to manage munitions production facilities and continental US munitions storage and transportation. The Navy support provided munitions transportation from US ports to Southeast Asia.

There were several other Air Force organizations vital to the munitions logistics system. The Air Force Systems Command (AFSC) was involved in new munitions development and modification programs for existing munitions. Although the AFSC was deeply involved in logistics support to the war there was speculation that civilian engineers and military leaders in that command did not do all that they should have to provide new or improved munitions to the USAF.

On the other hand, the author found a great deal of source material on the Air Force Logistics Command (AFLC). The greatest contribution by the AFLC was to create the transportation system which, in conjunction with the Navy and the Military Airlift Command, helped to resolve critical munitions shortages in the shortest time possible.

Question Three. How was the munitions reporting system organized and how effective was it?

Answer. Munitions reporting problems were created as a result of munitions shortages and the centralization of authority to higher levels in the chain-of-command. At one time there were 14 different reporting formats required of units in Vietnam by the Seventh Air Force, the USMACV, and the CINCPACAF munitions staff. A standardized reporting format compatible throughout the chain-of-command had never been required during peace-time. When it was implemented in war-time, logisticians found that they could not track munitions throughout the supply pipeline. The USAF reporting system was cited as effective by the AFLC but ineffective by the Joint Logistics Review Board.

As a corrective measure the Emergency Action Reporting for Logistics Action Programming (EARFLAP) was created. Using this format, the munitions staff at Seventh Air Force collated all unit inputs and the report through the system. It was effectively used through 1969 when it was replaced by the D078 system. It made daily reporting easier and more accurate, reduced the volume of priority message traffic, and promoted a quality control mechanism which did not exist up to this time.

Question Four. How were the continental US and the intra-theater munitions transportation systems organized and how effective were they?

Answer. Initially, munitions transportation was accomplished entirely by the Navy. Stockpiles were transported from the CONUS to Subic Bay, in the Philippines, where they were put in storage or transported to Vietnam. This was time consuming, taking as much as 270 days to get munitions from production facilities to the forward operating locations. Initially this did not present a problem. But, early in 1965, munitions shortages forced logisticians to develop new tranportation methods to shorten the transport time.

The primary objective was to develop a system which would remove the Philippines as a storage point. This was difficult to do because in-country munitions storage facilities in Vietnam were limited. As a means of circumventing this problem, the Air Force contracted for merchant ships to transport the munitions to Vietnam and hold the cargo in storage off-shore. Project Special Express served this purpose well. Once the USAF established in-country storage capability and munitions were no longer "pushed" to units, Project Special Vessels replaced Special Express.

Another munitions shortage problem was the lack of enough sub-components to build complete rounds. To meet this shortfall a munitions airlift program was created. Project SEAIR was an effective means of resolving the incomplete round problems and it also acted as an intra-theater munitions supply system.

All three transportation programs combined to overcome severe munitions shortages, which, early in the war, forced units to curtail and/or miss sorties. It was an innovative system which required the support of the Army, the Navy, and the civilian merchant shipping fleet.

## Post-War Munitions Activities

The majority of munitions-related activities in Southeast Asia (SEA) ended for the Air Force in 1973 with our evacuation from Vietnam. In the 15 years since then, USAF munitions activities have remained almost as they were during the war. New aircraft, such as the A-10, the F-16, and the F-15, have been added to the inventory. They are faster and have greater munitions carrying capacity than earlier aircraft. However, with respect to aircraft weapons loading operations, the only change of major proportion is the cross utilization of weapons loading personnel for some aircraft maintenance duties and the reduced size of load crews from four people to three. All loading operations are basically the same.

The same is true of munitions storage and assembly operations. The munitions inventory of today remains almost identical to that of the Vietnam War. Very few new munitions have been added to the inventory, while some, like napalm bombs, have been removed. Those new munitions include the Durendal runway penetrating bomb and improved versions of air-to-air missiles. Munitions transport trailer inventories

remain unchanged except for the addition of new towing vehicles.

In this author's experience as a munitions inspector for the Pacific Air Command, the most alarming trend for the future is the Air Force's inability to mass produce conventional munitions. Since the war's end the Air Force has measured operational unit's munitions production capability through Operational Readiness Inspections (ORIs). The scenarios used during the ORI cannot duplicate war-time operations because of the multitude of peace-time simulations required. For example, the majority of munitions in storage at overseas locations are war reserve material and cannot be expended except in combat. Therefore, munitions storage, assembly, and transportation operations do not duplicate what would actually happen in combat. Additionally, the ORI cannot and does not apply realistic combat stress of either physical or psychological nature.

As a result, for the last 15 years, the Air Force has neither practiced nor tested its real munitions production capability under realistic, sustained, combat conditions. Couple this with the figures in Chapter One which showed the lack of munitions officers and enlisted personnel with combat experience who remain on active duty today, and Air Force leaders must ask if they still have the capability to support an extended conventional war with the high sortie rates experienced in Vietnam.

In 1984 this question was asked by Lieutenant General Leo Marquez, the USAF Deputy Chief of Staff for Logistics and Engineering at the Pentagon. In response to the same concerns mentioned above, General Marquez directed the munitions staff at the Pentagon to study the problem and propose actions to re-establish the capability of units across the tactical air forces to produce munitions as we did during the Vietnam War.

The result of the study was a proposal for creating a conventional munitions production school which required its students to mass produce munitions at the same rate as units did in SEA without any simulations. General Marquez agreed to the proposal and directed immediate action to make it happen. In a memorandum from his office to the Pentagon munitions staff General Marquez said:

> I want this done right, from start to finish, and equally important, I want it done fast. Correction of this critical deficiency is the most important job any of us could hope to accomplish, not only for the munitions community, but for our entire combat forces (19).

In 1985 the school became a reality. It was centered at Herlong Army Ammunition Depot in California and became known as the Air Force Combat Ammunition Center (AFCOMAC). Although it is not yet possible to measure its success, those who have attended have said it greatly increased their knowledge of combat munitions production and they feel they are better prepared to support combat sortie operations.

## Recommendations for Further Study

This report has discussed only a few aspects of munitions logistics operation in the Vietnam War. There are other areas which were important. The following topics require further study:

* An analysis of the munitions production industry after the Vietnam War.

* The impact of explosive safety restrictions on munitions operations in Vietnam and in peace-time.

* The role of Explosive Ordnance Disposal in Vietnam.

* Munitions storage capacity across the Air Force's Pacific bases; Is it sufficient?

* Munitions operations and air base operability; Are we training technicians to survive and operate during and after air base attacks.

* An analysis of the Air Force Combat Ammunition Center (AFCOMAC).

## Appendix: Classified Sources Found At Simpson Historical Research Center

The following is a list of materials found in the Simpson Historical Research Center, Maxwell Air Force Base, Alabama, which was applicable to this study, but which was classified either secret or confidential and therefore not used. This list might be used for further study of this topic once it is declassified, or it could be used in a classified thesis. The unclassified title of the document is listed alphabetically followed by the title, index number, and document date.

Air Force Logistics Command
Munitions Support to SEA: Project Special Express
K200,03-76
15 Oct 1965

Air Force Logistics Command
Depot Plant Modernization
K201-380
19 Mar 1975

Air Force Systems Command
Air Force Armament Laboratory History
K243.0146
1966 thru 1975

Air Force Systems Command
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# Vita

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This analysis examined Air Force munitions logistics support in the Vietnam War. It's objective was to foster an understanding of the munitions logistics system, the level of preparedness before the war started, the problems encountered, and the solutions to those problems. The author hoped to highlight those problems which impacted upon Air Force operations and focus the attention of logisticians toward viewing future munitions support as an indispensible part of the nation's preparation for war.

Chapter Two presents a short history of the munitions industrial base from World War I up to the beginning Vietnam War. It looks at the level of preparedness of the munitions industrial base prior to each war and the problems encountered in trying to maintain industrial readiness in the periods of peace between the wars.

Chapter Three lists the military and civilian organizations which supported Air Force munitions operations during the war. It starts with the evolution of the Department of Defense, goes through the Joint Chiefs of Staff, and then to the military organizations which made up the chain of command. The purpose is to help the reader establish an understanding of the organizations which later influenced operations when munitions shortages became a problem.

Chapter Four is a chronology of munitions shortfalls. It discusses the condition of the munitions stockpile at the start of operations in 1965. Next, it looks at the impact of munitions shortages and the centralization of management authority and responsibility to higher levels of command up through the Department of Defense. It looks at other problems and solutions which were created as a result of munitions shortages, such as reporting procedures and transportation initiatives.

Chapter Five is the conclusions, recommendations, and actions taken since the war's end. It also lists several topic areas for future study. Thesis. (SEM)